Excavation of the Right Redoubt and Blockhouse, British Fortifications at Ile aux Noix, Quebec

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Roger T. Grange, Jr.

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by Roger T. Grange, Jr.

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Abstract

The first British fort on Ile-aux-Noix was constructed after the island was re-occupied in 1775. The right redoubt was one of three added to the fortification system in 1782. The 450-foot-wide redoubt was a pentagonal structure with timber casemates beneath its earthen ramparts. The blockhouse stood in the centre of the redoubt.

Ile-aux-Noix was abandoned in 1809 but re-occupied in 1812. Construction of a navy yard on the island was soon begun and by 1814 the right redoubt and blockhouse had been leveled to make way for this new facility.

All but traces of the left and front redoubts were destroyed by the construction of Fort Lennox in 1819, leaving the right redoubt site as the best source of information about these British fortifications, despite its purposeful destruction.

The 1965-66 excavations of the right redoubt and blockhouse at Fort Lennox National Park, Quebec are described in this report. The structural remains of the blockhouse and the features found in a test of the redoubt rampart and casemates are discussed. The archaeological features are correlated with historical plans and elevation drawings of the redoubt.

The artifacts, mostly from the debris of the later navy yard period (1813-34), are described and used to confirm the dating of the redoubt and blockhouse structures. The report provides data for comparative studies and may also serve as the basis for the planning of future excavations.

Submitted for publication 1974, by Roger T. Grange, Jr., University of South Florida, Tampa, Florida.

Preface

Ile-aux-Noix, now the site of Fort Lennox National Historic Park, underwent several seasons of archaeological excavation prior to site development and interpretation. During the 1964 season emphasis was on structures built after the War of 1812; the 1965 season explored the structures of the 1812-70 period (Rick 1970: 28-9). The major thrust of the 1966 season was a search for structural remnants of the French period (Rick 1970: 29; Grange 1974). However, those efforts to further explore the British right redoubt and its associated blockhouse, which had been partially excavated in 1965, are the subject of this report.

The historical research in preparation for archaeological work at Ile-aux-Noix included Lee's summary (1965) and his comparative map analysis (Lee 1966); Lambart's brief historical resume (1963) was also utilized in the field. Copies of various historical maps and plans of the site have also been available.

The initial excavation of the redoubt was undertaken in 1965 by students enrolled in an archaeological field school under the direction of Michael Ashworth and Ian Rodger (Ashworth 1966; 1967). The immediate supervision of the crew of locally hired labourers was by Paul Villeneuve (redoubt) and Carmen Lambert and Francine Mayer (blockhouse). Field notes and reports by those students were utilized in the preparation of this report.

During 1966 the author directed the work at Ile-aux-Noix, assisted by Marcel Plouffe and Tim Senulis in the field, and Joan Thompson in the laboratory where all specimens were washed and numbered. There was no formal field school in 1966, but two students, Micheline Dumont and Michel Lessard were field assistants in training. They both worked intensively on the redoubt and blockhouse projects, taking photographs, taking notes, drawing plans and profiles and supervising the workmen. At the end of the season they prepared summary reports as did the two field assistants. All of these field materials were used in the preparation of this report.

Armand Mainguy, then Superintendent of Fort Lennox National Historic Park, and his staff were of assistance to the field party who lived on the site in the headquarters building. The locally recruited field crew and some interested local citizens contributed to the success of the project. More recently Jervis D. Swannack, then of the Research Division, National Historic Parks and Sites Branch, and the staff of the Research Division, especially Olive Jones and Lynne Sussman, have provided assistance during the analysis of the materials. I have drawn heavily upon Michael Ashworth's manuscript reports of the 1965 excavations.

I gratefully acknowledge the assistance of those who have helped me to complete this work; the interpretations presented are my own responsibility.

Historical Review

Four major periods serve well to summarize the history of Ile-aux-Noix for archaeological purposes. These have been discussed in detail elsewhere (Lee 1965: iii; Grange 1974; see Table 1).

The island, located in the Richelieu River at the north end of Lake Champlain, was a point of obvious strategic significance in the defense of Montreal (Lee 1965: 1) despite the limitation that it could be by-passed by attacking forces if land routes around the island were found (Lee 1965: 3-5).

The French fortified the island in 1759, anticipating a British attack which came in 1760 and quickly resulted in a French retreat (Lee 1965: 1-12, 14-18). The British troops occupied the island, made an obviously incomplete effort to destroy the French fortifications and abandoned the site in 1761 (Lee 1965: 18). These events constitute the first major occupation period of Ile-aux-Noix.

The island was vacant until the American Revolution when its strategic position resulted in increased activity. American troops encamped on the island briefly (Lee 1965: 20-3) and then the British occupation of period 2 began. Major construction took place during this period. Parts of the old French fort were used for the first British fort (Lee 1965: 25; Map 2). Apparently the original French works had not been completely destroyed by the British in 1760 because the former entrance and other features were used by the British when they re-occupied the island in 1775 (Lambart 1963: 5). Blockhouses were also built before 1779 (Lee 1965: 25), followed by the most important construction work related to this archaeological report, the erection of the redoubts in 1782.

> By 1782 the British decided that a stronger fortification was needed on Ile-aux-Noix and about 4,000 Germans and British regulars were allocated for construction work there. There was some language difficulty at first, but the two groups got along fairly well. It was in this year that redoubts to enclose casemates and barracks were begun under the direction of the engineer William Twiss (Lee 1965: 25).

Three redoubts were built and two more sites planned (Lee 1965: 26). The left or No. 1 redoubt was south of the British fort and the front or No. 2 redoubt was to the west (see Figs. 1, 2). The third redoubt was north of the fort and was called the right redoubt on the 1809 plan (see Fig. 1) and No. 3 on a 1789 plan (Canada. Public Archives, H4/350 1789, plan c). These fortifications were never fully completed and fell into ruin through neglect (Lee 1965: 27).

The fortifications on Ile-aux-Noix were again abandoned in 1809 and it remained vacant until 1812 (Lee 1965: 28) when the strategic importance of the island in the Richelieu was brought to the fore during the War of 1812. This marks the beginning of period 3. It was decided to establish a shipyard for the construction of naval vessels on the island in 1813 (Hooper 1967: 3) and by 1814 the right redoubt had been leveled for the new facility (Lee 1965: 33; see Fig. 2). The redoubt may have seen some use during the initial phase of period 3 but it was primarily a structure of period 2. During period 3, naval buildings were constructed on the site of the former defensive work.

Later in period 3, the first British fort and the remaining two redoubts were replaced by the construction of Fort Lennox in 1819-28. The navy yard remained active until 1834 and military occupation of the island ended in 1870 (Lee 1965: 40-1).

Period 4 encompasses the modern uses of the island from 1870 to the present.

Archaeological excavations in 1965 and 1966 exposed parts of the redoubt and its blockhouse, structures of the period 2 (1775-1809) occupation. There is no difficulty in the identification of these structures on the basis of their location, size, shape and correlation with historical plans (Ashworth 1967: 93). The structural remains are overlain by debris from the later period 3 occupation; a consideration of the potential sources of artifacts in these strata must include a brief review of later buildings which were excavated (Ashworth 1967) but which are not the subject of this report.

The sequence of structures erected on or near the site of the right redoubt has been summarized in a map analysis by Lee (1966) from which the following discussion is drawn.

Southwest of the limits of the former redoubt line were structures identified as stables on the plans of 1816, 1819 and 1823. A single building had a similar identification in 1829; it was removed in 1842 (Lee 1966: 6, No. 52).

At the western salient of the redoubt, a structure with a general north-south orientation along the long axis of the island is identified as the principal storehouse used by the navy. It appears on the plans of 1816, 1819, 1823 and 1842 and its location relative to the presumed location of the redoubt varies somewhat from map to map (Lee 1966: 7, No. 53).

Another structure near the redoubt site was just south of the presumed location of the southern salient. This building was a work shed on the 1816 to 1829 plans but was identified as a stable when removed in 1842 (Lee 1966: 7, No. 54).

Inside the area of the redoubt between its south salient and central blockhouse was another structure. Shown as a small building on the 1814 and 1823 plans and larger in size from 1829 on, it was a multi-sided building with wings. It was identified as a navy commissariat on the 1816 and 1819 plans and as a commodore's quarters in 1823. A large structure on this location is identified as sergeants' quarters on the 1829-52 maps (Lee 1966: 7, No. 55).

Also within the redoubt area towards its eastern end was a building designated as the captain's office in 1829 and the schoolhouse in 1870 (Lee 1966: 7, No. 56).

A short distance to the north was the marine barracks built in 1814 and burned in 1864 (Lee 1966: 7, No. 60); this building does not overlie the redoubt site.

There were other structures in the navy yard on Ile-aux-Noix but those discussed above are within or adjacent to the former redoubt site and therefore might be expected to have contributed debris to the fill deposits above the redoubt structure. The remains of such buildings may impinge on the redoubt. Indeed, it was the search for the storehouse foundation which led to the discovery of the remains of the redoubt (Ashworth 1967: 93).

It is evident from the time span covered by these buildings that the redoubt site was in use, not only during period 2 when it was a functional structure, but also throughout period 3.

Some distance south of the redoubt site, along with miscellaneous navy yard structures not discussed above, was the site of an earlier building, Burgoyne's barracks. This period 2 structure was used for storage in period 3 (1812-33) and its location was noted on the 1842 plan of the island (Lee 1966: 6, No. 50). It was excavated in 1964 (Barka 1970). Like the marine barracks to the north, it does not impinge on the redoubt site, but refuse from its occupation could have been included in trash in the redoubt area.

In addition to the period 2 and 3 occupations of the redoubt area there is the possibility that the site was also occupied during period 1. The French built two redoubts in the general area of the middle of the island, but the precise location of these fortifications is difficult to determine from the French plans (Lee 1965: Maps 1-4). During the 1966 field season, fruitless test excavations searching for these structures were conducted. Although the French redoubts were not found, remnants of their main fort were located and it was concluded that the British plan of 1780 appears to bear the most accurate representation of the early French lines. A correlation of that plan and present features was prepared (Grange 1974: Fig. 75). On that correlation the location of a line representing the French redoubt Saint Louis falls just to the east of the location of the 1783 right redoubt. The correlation is not precise, but it suggests the possibility that the British may have reused portions of the former French work for their redoubt just as they did with their fort and redoubt No. 2 (Grange 1974: 74). If this interpretation is correct, there is the possibility that some remains of the French occupation of period 1 might be found in the redoubt site. No structural remains identifiable as French were encountered in the redoubt excavations but some French ceramics were recovered. Broader excavations in this area would be necessary to explore this hypothesis concerning the location of the French redoubt Saint Louis.

This brief historical review shows that the redoubt site was possibly occupied during period 1. The redoubt itself was constructed during period 2 but never completed according to the maximum plan of development. It was in use from 1783 until the island was abandoned in 1809. Maintenance was probably minimal during this 26-year period and further decay probably occurred during the ensuing three years of abandonment. Shortly after the start of the period 3 occupation in 1812, the redoubt was destroyed to make way for the shipyard. The maximum span for the functional existence of the redoubt and its blockhouse is thus from 1782 to 1813. Its intentional destruction probably removed sufficient portions of the structure to make reconstruction of the feature from archaeological evidence difficult. The site was subsequently occupied throughout period 3 until military abandonment in 1870; considerable mixture of specimens in this area is likely.

During period 4 the site was utilized as part of a campground in the years just prior to archaeological work so that modern intrusive specimens found during the excavations are not unexpected.

The Excavations

Despite its purposeful destruction, more of the right redoubt remains to be explored archaeologically because the left and front redoubts were either buried beneath the massive ramparts of Fort Lennox or cut by its moat. Surface depressions related to the left and front redoubts have been identified and the front redoubt was tested as part of another excavation but at best only salients or shoulders of those fortifications remain while the entire plan of the right redoubt is potentially available. Later structures obscure parts of its pattern but much could be exposed by excavation.

The right redoubt measures about 450 feet across its widest point. The redoubt was a pentagonal structure with an earthen glacis, ditch and ramparts. The redoubts included some stone, but wooden construction was significant because 80 to 100 axe-men were employed in its construction (Lee 1965: 25). In his description, Lee says that the casemates were of masonry, the walls were probably log pickets (Lee 1966: 2) and that:

> The redoubt was described as having been "raised on a mean Five Feet" and (later), "the wall is two feet above the entry but two rows of masonry on the casemates and the rest of the stonework are finished." A well was dug inside the redoubt and there was also a blockhouse (Lee 1966: 2-3).

Methods

The excavation of the right redoubt and blockhouse began in 1965 (Ashworth 1966; 1967) and was continued in 1966 (Grange 1967).

Infra-red air photos were used in conjunction with a geohm resistivity survey of the island to locate potential areas of excavation. Such crop mark and sub-surface data were correlated with the various historical plans and previous excavations of the 1964 season (Barka 1970) in pre-excavation planning.

Exploration of the redoubt in 1965 was aimed at the identification of the structure and the location of its limits. Two corners were exposed and the walls were followed by the excavation of small squares and by probing the intervening unexcavated spaces (Ashworth 1967: 92-3). The redoubt was not a primary goal in 1966, hence these excavations were continued on a very limited scale. The purpose was to expose a somewhat larger horizontal portion of the wall structures and to obtain a cross-section of the ditch and structural remnants. The work accomplished in both seasons combined is so limited in scope relative to the size of the structure that it amounts to little more than preliminary test excavation (see Figs. 3, 4).

While exploring the interior of the redoubt in 1965, the stone foundation of the blockhouse was encountered. Probing quickly led to the location of the four corners and one quadrant of the structure was excavated (Ashworth 1967: 114-7). One goal of the 1966 season was to complete the excavation of the blockhouse; the excavation revealed some structural features not seen in the earlier work.

The excavations were carried out during both seasons with standard archaeological hand tools and techniques. The field notes were recorded in the operation, sub-operation and lot system standardized for field projects of the National Historic Parks and Sites Branch (Swannack 1973). Horizontal control involved the use of arbitrary operation and sub-operation units tied to the grid system established for the site. The grid system utilized a north-south base line oriented along the long axis of the island rather than on magnetic or true north. Excavation units were sometimes delimited by the dimensions of the structures being investigated, as in the case of the blockhouse. The 1965 excavations primarily employed arbitrary excavation units for vertical control although some cultural units were followed. Excavation in 1966 was carried out on a stratigraphic basis in most operations although a few arbitrary lots were defined. With a few exceptions the excavations from the two seasons can be correlated with one another and the stratigraphic sequence. Subsequent laboratory analysis indicates that the specimen contents of the stratigraphically excavated units contain a mixture of specimens from both the redoubt and later navy yard periods. Very few undisturbed features such as builder's trenches or floor layers were discovered and those that were found contained very few artifacts. The lack of undisturbed occupational zones was not unexpected in view of the history of this site on Ile-aux-Noix.

The Blockhouse

Excavation Units and Stratigraphy

During the 1966 excavations, the blockhouse was divided into quadrants for specimen control and since the line of the structure could be plotted from the previous work, separate lots were also designated to reflect specimens recovered from inside and outside the limits of the stone foundation. Lots were also based on stratigraphic position and on the contents of trenches or other features.

The general stratigraphic sequence in the blockhouse areas began with the turf or sod level. Below this was a layer of dark soil mixed with brick chips and other refuse; a general occupational debris zone. Beneath this occupational debris lay the stone foundation of the blockhouse structure. Refuse deposits overlying the wall, builders' trenches associated with the foundation, and features such as drains cutting the foundation, were encountered in relation to the foundation stones. The lowest stratigraphic unit was a layer of sandy clay sub-soil (see Fig. 5).

No specific lots were segregated for the turf layer. None were employed in the 1965 work and the grass roots were stripped from the entire feature under Ashworth's direction at the start of the 1966 field season prior to the author's arrival at the site. Other 1966 excavations segregated all specimens from the sod level.

The first step in the 1966 excavation of the blockhouse was to remove the backfill from the previous season. Numerous specimens, particularly pottery, were found in this process and were designated a separate lot which must be regarded as a useless mixed provenience. The 1965 excavations of the corners of the structure included materials from both inside and outside the foundation wall line while the 1966 work separated such specimens. Study of the 1965 field notes indicates that one corner exposure cut through a post-blockhouse drain ditch and must therefore be a mixed lot.

Beneath the occupational refuse zone a pile of rubble overlying the foundation wall must be regarded as a post-blockhouse feature. It may align with the late drain previously excavated (Ashworth 1967: 314-20), but this potential relationship could not be pursued during the time available in the season. Another post-blockhouse feature was a ditch cutting through the northwest corner of the foundation. Another linear ditch-like feature which appears on the field map to have been cut by the exterior foundation wall was detected within the refuse layer which also overlays the foundation level and must therefore be a post-blockhouse feature. This could be related, along with the other post-destruction ditches, to the drainage system thought to serve structures built after 1819 (Rick 1970: 29), although it could have served earlier structures as well (Ashworth 1967: 315).

No artifacts were recovered from the stone foundation itself, except in the two notched corners of the central platform of the blockhouse. These corners were filled with a continuation of the post-blockhouse refuse layer and are therefore included in the occupational zone.

Traces of builder's trenches adjacent to the blockhouse foundation were discovered in several locations. These could not be traced continuously around the structure, but were excavated as separate stratigraphic units where they could be found. Unfortunately, few artifacts were recovered from these features. One interior trench contained a sherd too late to represent construction period fill. The sherd may be an intrusive specimen. The ditch may be a demolition trench rather than a builder's trench, or it could be related to a drain system from a later structure in the area.

The sandy clay sub-soil layer was culturally sterile.

The bulk of the specimens found during the excavation of the blockhouse was from the occupational layer above the foundation. That layer must be a mixed zone containing materials from both the occupation of the blockhouse and the later navy yard period.

Structural Features

The blockhouse was located in the centre of the redoubt (see Figs. 4, 6). The corners of the structure were at the cardinal points on the excavation grid and subsequent references are so oriented.

The structural remains consisted of mortared masonry foundations (Fig. 7). There was a central square platform and a continuous foundation wall around the perimeter. Midway between the perimeter wall and the central platform was an intermediate structure consisting of a series of discontinuous stone pillars aligned to form an intermediate wall-like line (Fig. 8). The upper surfaces of the walls and the central platform were irregular and mortar-stained. Courses of stones above the preserved remnants had been removed, presumably when the structure was razed in 1813, leaving the excavated remains without their original surfaces. It is, therefore, no longer possible to determine if the central platform served as a hearth and foundation platform for a series of central fireplaces; in addition, the location of such features as doors or windows had been obliterated by the demolition.

The maximum exterior dimensions of the perimeter wall are 34 ft. on each side. The perimeter wall was 2 ft. thick and was preserved to a depth of 1.75 ft. The elevation of the top of the wall was 100.1 ft. ASL in general but varied from 99.2 ft. ASL to 100.3 ft. ASL. This elevation range is interpreted as evidence that the intent during the demolition of the blockhouse must have been to achieve a grade level of about 100 ft. ASL.

The exterior stones on the outer wall are well cut or selected for facing stones. The interior side is laid to form a straight face but lacks dressed stones. The west, north and east walls have bonded corner joints at the grid north and east corners of the building. In contrast, the south wall was built as a separate unit so that the west and south corner joints are butted rather than bonded (see Figs. 9, 10). The base of the interior side of the perimeter wall is 0.2 ft. to 0.3 ft. wider than the top; the wall has a footing (see Fig. 11). The footing was exposed or traced by probing and found in nearly all locations around the interior of the wall. The use of a footing may be evidence that the blockhouse was a two-storey structure.

Some evidence of builders' trenches was encountered on the exterior side of the perimeter wall. These trenches could not be traced completely around the structure. No evidence of these features was recorded during the 1965 excavations in which the corners of the structure were located. A portion of a builder's trench along the southeast side of the structure (Fig. 12, foreground) was 0.7 ft. wide and up to 1.0 ft. in depth. It appeared as a dark stain in the soil adjacent to the stone foundation wall (Fig. 12). A continuation of this trench was also excavated towards the east corner of the structure but did not produce any specimens. Another well-defined segment of the builder's trench was found along the northwest side of the foundation. It was 1.1 ft. wide and 0.4 ft. in depth where preserved (see Fig. 13). A third section of the builder's trench associated with the exterior wall was along the northeast side of the building. It was about 1.0 ft. in width and up to 0.5 ft. in depth. Near the north corner of the foundation a drain cut through both the structure and this feature (Fig. 14). This section of the builder's trench also continued into the next quadrant of the structure but the feature was treated as a single unit of excavation. These features were probably related to the construction of the building. Unfortunately, few artifacts were recovered from the builder's trenches and it should be noted that, because of the purposeful demolition of the building, some intrusion of later specimens into these features is not impossible. These factors suggest that the trenches might have been demolition trenches instead of construction features.

In the centre of the blockhouse was a 12-foot-square stone platform. Its sides were generally straight although some overhanging stones increase the measured width to 13 ft. in some places. The platform was made of angular rock of varying sizes. Rectangular rocks and larger stones were used near the corners and along the edges (Fig. 15). The upper surface of the platform was irregular and its stones covered with mortar stains, indicating that upper courses of rock had been removed during the demolition process. The elevation of the platform surface as exposed ranged from 100.05 ft. ASL to 100.2 ft. ASL, again reflecting the approximate 100-ft. elevation evidently selected as the post-demolition grade. It may be presumed that at least some structural evidence was destroyed, making a complete reconstruction of the feature difficult.

At the grid north and south corners, the platform corners are not right-angled as are the grid east and west corners. The north and south corners have rounded insets or corner socket-like structures. The sockets are 0.8 ft. deep from the top of the platform, are inset 1.3 ft. to 1.5 ft., and have curved backs. The bases of the two insets are at 99.2 ft. and 99.45 ft. ASL. The interpreted function of these inset sockets is a support for vertical structural members; this may have implications for the reconstruction of the blockhouse form (see Fig. 16).

A portion of a builder's trench was found along the northeast side of the central platform but it contained no specimens. This feature aligns with an exterior ditch and could be part of a drain or a demolition trench rather than a builder's trench.

Excavations were aligned to provide a cross-section of the structure (see Fig. 5) and in that profile it is evident that the central platform was erected on a pad of mortar about 0.5 ft. thick. The mortar pad rested on the sandy clay sub-soil zone. The base of the mortar pad is about 99.6 ft. ASL. The stone layer in the platform ranges from 0.5 ft. to 0.75 ft. thick. Evidence of builders' trenches adjacent to the perimeter walls and to the intermediate piers may also be seen in the profile (see Fig. 5).

The exterior dimensions of the pier line or intermediate wall are 22 ft. by 22 ft. The L-shaped corners are not uniform but range from 3.5 ft. to 4.5 ft. in length. The piers are 3 ft. to 4 ft. long and 1.5 ft. to 3 ft. apart, most being 2 ft. apart. The piers are 1.5 ft. wide. Their tops are at about the same 100-ft. ASL elevation of the other masonry remnants. The bases of the piers are at 99.3 ft. ASL; that is, about the same elevation as the central stone platform, but not as deep as the exterior wall. The profile (Fig. 5) shows traces of foundation trenches 1.5 ft. wide and 1.0 ft. deep associated with the intermediate wall piers.

The function of the intermediate piers may have been to support heavy joist timbers supporting the floor of the structure. They are halfway between the outer foundation wall and the edge of the central platform.

The evidence of the purposeful leveling of the structure to elevations close to 100 ft. ASL and the indication that rock has been removed from the upper surfaces of the wall, the platform, and the piers indicate that the occupational level associated with the blockhouse must have been greatly modified at the time of its demolition. It was therefore anticipated that the overlying stratum would be mixed in its artifact content and that was found to be the case.

Only three potsherds were recovered from builders' trenches; not all are consistent with the 1780s construction date of the building, and some of these features may date to the demolition period.

Some post-blockhouse features were found. These include a linear pile of rubble (*see* Fig. 17) above the perimeter foundation wall. Its alignment suggests it may be a refuse-filled drain connecting to the drain excavated in 1965 but that could not be demonstrated because of the limited excavations.

Another post-blockhouse feature is a ditch, probably a drain, which cuts through the wall, removing rock, at the north grid corner. If a drain, this feature too could have connected with the earlier one in some fashion. There is no doubt that it is a post-blockhouse feature (*see* Figs. 14, 18).

Two unidentified stains near the northwest side of the outer wall may represent another ditch intersecting the wall, but they were difficult to interpret. They appear in plan to be cut by the foundation wall, but since the stained fill was detected within the occupation refuse layer which overlies the foundations, the ditch must be a post-blockhouse-destruction feature (*see* Fig. 19). A possible extension of this ditch, adjacent to the central platform, might also be interpreted as a builder's trench. Wood stains associated with this feature led to speculation in the field that it could be remnants of floor boards or other timbers or that it could be part of a wooden drain. The alignment of the feature may indicate the possibility that it once connected with the drain excavated earlier which was thought to be related to later structures. Only by tracing this feature to its limit could it be identified, and that was not possible.

Lee illustrates a blockhouse in plan and section suggesting that the redoubt blockhouses may have resembled this structure (Lee 1966: 3, Appendix 1). That plan is of a rectangular rather than a square structure and has a hearth and chimney in one corner. These features are unlike the archaeologically exposed foundation; the illustration may be rejected for reconstruction purposes.

It is more likely that the blockhouse was similar to those still standing at Lacolle (Ashworth 1967: Fig. 6-3, p. 123) or on Ile Sainte-Hélène (Ashworth 1967: Fig. 6-2; Grange 1967: 12) both of which are square and have central chimneys. The Lacolle blockhouse has a second storey which has the same orientation as the first floor, but with larger dimensions resulting in a short overhang (*see* Fig. 20) (Ashworth 1967: Fig. 6-4, p. 125). Some other British blockhouses of this general period, for example, one at Castle Hill (Grange 1971: Fig. 14) had second storeys aligned with the lower walls. The Ile Saint-Hélène structure has a rotated second storey so that its corners overhang the mid-walls of the first floor. The fact that two sockets in the north and south (grid) corners of the central platform were found in 1966 might be interpreted as an indication that the structure was like that of the Ile Sainte-Hélène blockhouse (Grange 1967: 12; Ashworth 1967: Fig. 6-2) (see Fig. 21). Such an interpretation rests on the assumption that the sockets served as footings for vertical support timbers which, in turn, supported a main joist across the diagonal of the second storey. The sockets may have had some other function.

The intermediate row of piers must be interpreted as supports for lower floor joists.

No solid evidence of door and window locations was encountered during the excavations.

The central platform may have served as the foundation for chimney, fireplaces and hearths on both the ground floor and the second floor of the blockhouse, but no trace of such architectural features was found. The 1814 plan (Fig. 2) illustrates the blockhouses of the other two redoubts in which the lower floor served as barracks and commissariat storerooms while the second floor was officers' quarters. Assuming similar functions for this blockhouse, the presence of fireplaces is a reasonable assumption.

The Redoubt

Excavation Units and Stratigraphy

The 1965 excavations in the redoubt employed numerous, small excavation units (Ashworth 1967: 92-100), to expose structural features. Some were contiguous and others which were isolated were arranged along a projected line of structural features checked by probing. More of the redoubt was excavated in 1966. The stratigraphic relationships of the excavation units are recorded in Table 3.

In 1966 the object of the excavations in the redoubt was to supplement earlier data with a cross-section of one side of the structure. The excavations were oriented so as to cross the redoubt near its southern salient at right angles to the line of its southwest side (Fig. 4). It was intended to extend these excavations far enough to provide a cross-section of the geohm survey anomaly recorded in 1964 which paralleled the line of the redoubt (Ashworth 1965: geohm survey plan). Study of air photos revealed the presence of a crop mark which also parallels the sides of the redoubt as exposed by excavation (Fig. 22). Presumably, the geohm anomaly and the crop mark must have some relationship to the redoubt structure - perhaps its ditch - or to the dispersal of soil from its ramparts and glacis. Due to the low priority of this project during the field season, excavation was not completed because it would have required too many crew members who were needed elsewhere. A portion of the redoubt structure was exposed and a narrow trench was extended across a portion of the geohm and crop mark line.

The uppermost stratigraphic layer was the sod zone and below that was a continuous layer of mixed soil including refuse, brick chips and artifacts (Fig. 23). In 1965 the excavations were divided into arbitrary, vertical lots which cross-cut the stratigraphic subdivisions shown in trench profile drawings made after the excavation was completed. Some of these colour differences could not be detected in the 1966 work, but where possible, such stratigraphic units were excavated as separate lots. Despite the use of arbitrary excavation units in 1965, these units correlate with some stratigraphic units as well; for example, the sod layer and the occupational zone. Where more than a single arbitrary unit was required to reach the culturally sterile sub-soil in 1965, the third excavation unit appears to have been below the elevation of the top of the structural remains. This was used as a means of correlating the 1965 and 1966 excavation lots, and in the latter season this elevation served as an arbitrary termination point within one stratigraphic level.

A possible layer of ditch fill below the refuse zone was segregated. An alignment of post moulds found below the refuse layer, although stratigraphically below the refuse layer where it was detectable, probably represent a later fence line. Only additional excavation to trace that line would permit the complete identification of these posts.

Beneath the general refuse zone was a variety of linear features, masonry walls, drains, rotted wood and soil stains which represent the remnants of the redoubt and its casemates.

The top of the structural remnants was found at an elevation of 100.8 ft. ASL to slightly below that elevation at 99.27 ft. ASL. This is similar to the uppermost elevations observed in the blockhouse area where it has been inferred that an elevation of about 100 ft. ASL was selected as the intended post-demolition grade (see Fig. 23).

The lowest stratum exposed by excavation was a natural layer of grey clay about 3 ft. below the surface. This zone was found elsewhere on the island and appears to be a continuous natural layer. The stratum immediately above the grey clay is also a natural layer and is a brown to yellowish sandy clay layer. The impermiable grey clay forms a layer associated with the water table and sub-surface water flow on the island and for this reason it would not be an ideal base for structural foundations despite its stability. The foundation bases are found in the brown to yellowish sandy layer an inch or two above the grey clay. Because of this drainage problem, it is evident that any casemate structures within the redoubt must have been built into the rampart of the fortification above the water table level; subterranean casemates would have immediately filled with water as did any excavation which penetrated into the grey clay level. It is notable that there is historical evidence that the redoubt foundation was above the level of springtime high water (Fig. 27).

One lot was removed from within a part of a masonry structure, but these specimens may have come from earth fill rather than from an integral part of the structure. The 1966 field work included an effort to cross-section several of the structural features; excavation lots from these tests were segregated. Specimens found within rotted wood deposits more likely represent fill debris than occupational refuse. This conclusion is supported by ceramic evidence.

Efforts to locate builder's trenches associated with the wall features were only partly successful. One possibility was found but the ceramic content of this feature is too late for the construction date. The sherds may be intrusive specimens, but an alternative explanation is that the trench may be a demolition trench. Test excavations below the refuse layer in sterile sub-soil produced some specimens. These are either intrusive or the identification of one of the layers was incorrect in the field.

Here, as in the blockhouse area, the bulk of the specimens was recovered from the mixed zone of refuse overlying the remains of the redoubt foundations. This zone must contain materials from both the redoubt occupation and the subsequent navy yard period.

Artifacts were recovered from the refuse occupational zone which buried the foundation remnants. The structures themselves were left intact with the exception of a few test dissections.

Structural Features

The large size of the redoubt combined with a relatively flat land surface made the observation of surface depressions related to the fortification difficult. An infra-red air photo shows a large, generally pentagonal crop and high water mark surrounding the area where the redoubt excavations were located (Fig. 22). A geohm resistivity survey made in 1964 (Ashworth 1966: map) also revealed a similar pattern of potential sub-surface features. These were aligned with the crop mark seen in the air view but were smaller in size and within the area delimited by the standing water. On the site map (Fig. 3) the crop mark, the geohm anomalies and the limits of the excavation are all shown. The geohm anomaly was found not to align precisely with the redoubt foundations (Ashworth 1967: 336). In the centre of the pentagonal crop mark on the infra-red photo is a faint, angular area of lighter colour than the surrounding surface. This crop mark, when transferred to the site plan, (and shown on Figure 3 as solid lines), may be seen to coincide nicely with the location of the structural remains exposed in the excavations. On the basis of this evidence, it is here suggested that the perimeter crop mark on the air photo, a line of slightly lower elevation than the area it surrounds, marks the exterior limit of the redoubt feature. This is interpreted as the location of the toe of the redoubt glacis.

The surface evidence did not figure prominently in Ashworth's planning of the 1965 excavations. In the 1966 season, it was intended to extend a trench across the presumed lines of the redoubt ditch and glacis as interpreted on the basis of structural data, surface features and sub-surface anomalies. Unfortunately, the limited crew available for this project (a low priority goal) was insufficient relative to the size of the structure and the sectioning trench did not reach the perimeter of the crop mark area. The redoubt was simply too big for excavation with the limited resources available (see Figs. 3, 4, 24).

Two corners of the redoubt were located. One is nearly a right angle while the other is an obtuse angle. This conforms to historical plans which show the redoubt (Fig. 1). The structural remains consist of a series of parallel stone walls, wood deposits, foundations and drains which will be described below (see Fig. 25).

One historical plan of Ile-aux-Noix is particularly important with reference to this analysis of the redoubt. This is the 1790 plan by Gother Mann (Fig. 26). The plan is one of a series illustrating various proposed improvements to the Ile-aux-Noix defenses. At the bottom of the plan is a section drawing of the redoubt profile (Fig. 27) showing elevations with and without casemates. Unfortunately, this plan was not available in the field during the 1966 excavations; had that been the case, the excavations would have been somewhat easier to plan and the features easier to interpret. The interpretation of the archaeological remains without the plan for reference (Grange 1967) was similar to the final interpretation presented here with the benefit of the plan. In the earlier interpretation, the casemate foundations were correctly identified but the line now interpreted as that of the scarp was thought to be the counterscarp. In the following discussion, reference will be made to this historical section of the redoubt.

In order to present a systematic description of the structural remains, each linear structural element will be given an arbitrary letter designation, beginning with the southernmost feature. Each linear element will be described individually, moving from the south to the north in sequence. (See Figs. 4 and 24 for assistance.)

The southernmost feature (A) was exposed in the excavation of a long, narrow trench which was intended as a cross-section of the surface evidence and sub-surface anomalies interpreted as the glacis/ditch area. The feature is a linear deposit of rotted wood. The alignment of the rotted material indicated that the feature parallels the line of the other walls exposed farther to the north. The mass of rotted wood was about 3 ft. in width and about 1.2 ft. in maximum thickness; its dimensions were irregular. Its top was at an elevation of 99.9 ft. ASL.

Immediately north of the line of wood (A) was another parallel feature consisting of angular rock and mortar (B). This feature is also about 3 ft. in width where best defined. In the trench profile it is apparent that this feature is at the bottom of an irregular trench filled with stained soil and refuse. The line of mortared rock was no longer a well-defined wall at the time of excavation. It is here interpreted as the base of a wall foundation from which the upper courses of stone were removed in the redoubt demolition process.

The close association of the rotted wood line A and the foundation remnant B is significant. On this basis, it is suggested that the stone feature is a basal remnant of a foundation which supported a timber work. This structural pair may represent the scarp of the redoubt ditch. The scarp on this side of the redoubt would have been on the north side of the ditch. Timber from the scarp revetment would have fallen or been thrown to the south of the supporting foundation (that is, into the ditch) prior to, or during demolition. Thus, the horizontal location of the two features is an expected one.

A timber revetment is shown on the scarp of the redoubt on the 1790 plan (see Fig. 27) but the nature of its supporting foundation is not clear on that document. The correlation of the archaeological remains and historical depiction is striking.

In addition to the two structural elements (A and B), parallel lines of stained soil were also encountered in this excavation. These were immediately associated with the A and B features, both to the south and to the north. They were insufficiently exposed for interpretation beyond the suggestion that they are related in some way to the stone and timber scarp structure.

One soil stain (C) farther to the north merits special attention. This feature is also aligned to parallel the direction of the walls. Its southern edge is 12 ft. north of wall remnant B and 12 ft. south of the line of stone foundation wall D, the best-defined line of the redoubt. As will be discussed below, wall D is probably the line of the redoubt interior revetment. Thus, the linear soil stain C appears to be at about the mid-line of the presumed redoubt rampart (Fig. 4). The historical profile (Fig. 26) does not indicate any mid-rampart structure. The function of these linear soil differences is not clear and additional excavation will probably be required to identify them properly.

The next major structural unit to the north consists of three parallel masonry features (D, E, F) (*see* Fig. 27). The complex consists of two well-built masonry foundation walls (D and F) with a cobble-filled space between them (E). The foundation walls consist of rectangular stones or angular stones placed to form straight-sided walls, well mortared in place. The intermediate area is filled with rounded cobbles, also mortared. Both the rectilinear walls and the intermediate construction were found in the 0.8-ft.-thick yellowish brown sandy clay zone and rested on a layer of pure sand 0.3 ft. thick in a dissected section. A portion of the original builder's trench along the south face of the exterior wall (D) was also discovered (*see* Fig. 4). At the point where this descriptive cross-section is taken, these foundation walls form an obtuse angle. They form a shoulder angle of the redoubt with an arc of about 165 degrees (Fig. 28). The westernmost end of the foundation wall terminates in a right-angled corner (*see* Fig. 25). The distance between the right-angled salient and the obtuse-angled shoulder corners is 125 ft. Using this dimension and historical plans as a basis, the other sides of the pentagonal redoubt can be calculated to be about 109, 156, 117 and 117 feet in length (Ashworth 1967: 99-100).

At the well-preserved right-angled salient, exterior foundation wall D can be seen to be a well-made structure (*see* Fig. 29) 2 ft. in width. The upper surface of the wall has a flat, undisturbed appearance at the salient corner; elsewhere some of the upper courses of rock had been removed during demolition.

The foundation wall was built in a builder's trench about 2 ft. deep. Two courses of undressed stone, mortar-bonded, were placed in the bottom of the trench. Upon these, the dressed stones, or carefully selected stones which formed the two parallel foundation walls (D and F) were placed. The space between the two walls was filled with rounded fieldstones and a great deal of mortar (Ashworth 1967: 96).

The inner wall (F) is narrower than the exterior wall, being 1.5 ft. in width. The intermediate space with cemented cobbles is 1.0 ft. to 1.2 ft. wide. At the salient corner, exterior wall D appears intact while the interior wall F is partly destroyed. Both were found largely intact for a distance of 19 ft. from the corner at which point only the intermediate cobble portion remained. At the shoulder angle the exterior wall also appears to have been built with more care and to have survived somewhat more intact than the inner wall. Both foundation walls (D and F) with dressed or carefully selected limestone and sandstone construction were apparently robbed for building material when the redoubt was demolished, while the intermediate cobble section (E) was left relatively undisturbed (Ashworth 1967: 96).

The intermediate cobble line was interpreted in the field as serving the function of a drain located between the two better constructed wall elements. Where relatively undisturbed, it does not seem to have been as high as the tops of the two adjacent walls, resulting in a rectangular U-shaped cross-section (see Fig. 23), and lending support to the drain interpretation for the interior element (E).

It is most interesting to note that the 1790 redoubt profile includes two foundation elements close to one another (Fig. 27). On the historical plan, the exterior feature (the equivalent of archaeological element D) serves as the foundation for the parapet supports which consist of angled and vertical upright timbers forming a wall anchored to the rampart fill. The inner foundation (the equivalent of F) supported a vertical post within the casemate. The casemate roof extends to include the outer foundation beneath its limits. Thus, wall D is seen as the parapet support foundation and as the casemate wall line, and wall F as the foundation for casemate uprights. This would put the intermediate cobbled line within the casemate at its interior edge; an ideal location for a drain as hypothesised on the basis of the archaeological remains. The drain feature is not clearly indicated on the 1790 plan but the two foundation elements are.

The next major structural element in the series across the shoulder angle is a mass of rotted wooden beams (G). These are oriented with their long axis parallel to the wall lines. These materials appear to be rotted casemate floor timbers or structural elements discarded during demolition. Their regular alignment may support the floor remnant hypothesis.

The rotted timbers are located between two parallel foundations, F to the south, and another line (H) to the north. This new structural element is poorly preserved (see Fig. 24) and badly disturbed. It was probably 2 ft. wide judging from the best-preserved section and consisted of small, angular rocks mortared together. Fragments of wood were found on top of the section near the shoulder angle.

On the 1790 plan (Fig. 27), the casemate is shown to have an intermediate foundation for vertical support timbers and it is likely that this was the function of this poorly preserved stone foundation.

The next structural element towards the north is another wall remnant (I) also parallel to the other walls (see Fig. 24). This wall line first appeared in the area of the shoulder angle as a linear soil stain. Upon excavation, the stain appeared to be the remnants of a builders' and/or demolition trench at the bottom of which was found a rock rubble wall 1.5 ft. to 2 ft. wide. It consisted of irregular rock and traces of mortar (see Fig. 30). In the early season of excavation at the redoubt, a series of small excavations (see Fig. 4) traced the line of this wall. Timbers were found on top of the wall in those excavations. In some areas the stones were only loosely mortared. Those timbers which were not badly decomposed would indicate that the timbers were square in section (Ashworth 1967: 95).

Reference to the 1790 plan (Fig. 27) again reveals a corresponding foundation structure forming the outer side of the casemate on the redoubt interior. On that plan, a foundation element is shown supporting a wall. The historical profile presents details of casemate roof construction which were not revealed by archaeological remains. It also illustrates a banquette and the parapet on the ramparts.

The historical plan shows that the casemates were timber structures behind a massive rampart and parapet and beneath the terreplein and banquette. The four foundations (D, F, H, I) were thought to be those of the casemate on the basis of archaeological evidence alone. The correspondence of these four parallel features and the foundation shown in the 1790 historical plan is a good indication that the interpretation was correct.

Two to three feet north, beyond the limit of the casemate wall foundation, another linear feature of stone rubble was found (J). The feature paralleled the previously described wall lines. It consisted of large, rounded field stones which were not mortared (see Figs. 24 and 31 a and b). This feature is generally about 3 ft. north of the casemate wall foundation, its distance varying with irregularities in its width which is, in general, 2.5 ft. The most notable aspect of this feature is that its centre line is composed of a row of bricks laid on edge with ends butted together (see Fig. 32). This arrangement can best be interpreted as a drain composed of large stones forming a trough with the bricks at the bottom/centre line. No drain is shown on the 1790 profile (Fig. 27) but the casemate appears to have a sloping roof and small eaves extending into the redoubt interior. The stone/brick drain (J) could have served to catch and drain run-off from the casemate roof or terreplein surface.

Still another linear feature was found to the north (K). This was a soil stain 15 ft. long and 2 ft. wide. At one end it has a right-angled extension which adjoins the line of the drain (J) (see Figs. 24, 33). This stain generally paralleled the walls but angled slightly away at its free end. Excavation revealed it to be an earthen feature about 1.0 ft. deep (see Fig. 31a). This feature is difficult to interpret from archaeological evidence alone. It is related to the redoubt structure. The 1814 plan of redoubt 2 shows ramps up to the terreplein level near the salient and shoulder angles. Perhaps this stain is related to such a feature. However, on the plan the ramps are shown at the ends of the barracks structures rather than along their sides. On the 1814 plan, ramps are shown adjacent to sections of the terreplein both with and without casemates (as that plan is here interpreted). Thus, the fact that feature K is adjacent to a foundation of a casemate is not necessarily in disagreement with the historical plans. The feature could, however, be a remnant of a path along the casemate leading to a doorway. Its interpretation is uncertain at best.

North of the right-angled salient corner and adjacent to the interior side of the parapet-casemate foundation complex (that is, adjacent to F), Ashworth found a right-angled alignment of stones (see Fig. 4, L). It extends 1.5 ft. out from the wall at right angles and then parallels the wall for 3 ft.; the feature consists of an alignment of single stones. The function of this structure has not been determined. One possibility is that it is part of a ramp structure, but the exposure is too small to solve the problem. It could also be a fortuitous rather than purposeful arrangement of rock rubble.

Between F and I foundation lines, a right-angled foundation consisting of angular stones and mortar join those two walls with the intermediate foundation line H (see Figs. 24, 34). This feature has been designated foundation M. Ashworth speculated that this might be a foundation for a guard tower (Ashworth 1967: 95). No guard towers are shown on redoubt No. 2 on the 1814 plan, but there is a magazine shown at a shoulder angle on that plan. The location corresponds to the shoulder angle location of the right-angled foundation; the feature may be a remnant of a magazine. It is also possible that the casemates were divided at intervals into rooms, in which case this foundation might represent the end wall of a casemate room. A much more complete horizontal exposure of the redoubt interior is needed for an adequate interpretation of the structural evidence.

In addition to features directly related to the redoubt, several post moulds were located (see Fig. 24). These could belong to a pre-redoubt period, to a structure within the redoubt or, most likely, to a post-redoubt fence line in the navy yard area. An insufficient number of the posts were exposed to trace the alignment and it remains unidentified.

Not far from the right-angled salient corner on the interior of the redoubt, a portion of a wooden drain was exposed. The relationship of this drain to the redoubt is uncertain. Its alignment could indicate an ultimate connection with post-blockhouse drains and perhaps with a probable post-redoubt drain system which has already been mentioned. Only tracing these drain segments further in all directions would solve this problem. They remain unidentified.

The 1966 excavations essentially constitute a cross-section of the redoubt and served to locate two of its five corners. The work, relative to the size of the structure, was little more than a preliminary test excavation. Furthermore, the trench towards the south was never completed. It did not completely section the surface and subsurface anomalies. Its southern end coincides with a geohm indication of a probable wall location (see Fig. 3) but no such evidence was encountered. Elsewhere in the redoubt, the anomaly appeared slightly offset to the south from the actual wall remains, so extension of the trench might have uncovered this presumed structure had such work been possible. Assuming the the correlation between the archaeological features and the casemate foundations shown on the 1790 plan to be correct, it is possible that the geohm anomaly sought by this trench may mark the location of the redoubt ditch counterscarp. We might predict that this feature would be marked by a parallel line of rotted timber along the northern side of a stone and mortar foundation remnant. Only future excavation can confirm this suggestion.

The width of the casemate from the parapet foundation line (D) to the interior wall (I) is a maximum of 18.5 ft. Allowing for wall thickness, the interior width of the casemate must have been about 14 ft. According to the scale on the 1790 section drawing, these two dimensions were 17 ft. and 13.5 ft. respectively. The archaeological dimensions could be used as a basis for re-measuring the structural components shown on the 1790 plan. The discrepancy between the as-found dimensions and the 1790 plan may be that the latter referred to proposed changes in the fortification and therefore may not have been a measured drawing of the existing structures such as casemates. Despite the dimensional divergence, the correspondence between the foundations exposed by the field work and those seen on the 1790 section drawing appears to be highly significant. On the basis of this similarity it is suggested that the details from the 1790 plan may be a reasonably accurate depiction of the redoubt and its structural elements.

Glass

Fragments of glass artifacts were common items recovered in the excavations of the right redoubt and blockhouse. Cylindrical (round-sectioned) wine bottles were the most numerous, but a few glass artifacts of other forms such as wine glasses were also recovered.

Cylindrical Wine Bottles

Most of the round-sectioned bottles belong to a class previously described from a dated feature (1812-14) at Ile-aux-Noix (Jones 1967). Jones describes these bottles as having the following characteristics: short neck in relation to body height; cylindrical body; two-part finish consisting of lip and string rim; gradual inward slope of the neck from its base to the lower string rim with a sharp indentation under the rim; pronounced curve at the base of the neck as it leads to the shoulder; slightly in-sloping body profile from the shoulder to the base; body sag at the base; variation in push-up forms; frequent irregularities in the finished product, and a dark yellow-green colour (Jones 1967: 5). The specimens recovered from the redoubt area are all fragmentary examples making it difficult to associate neck and finish forms with bases. A few specimens are nearly restorable and on the basis of colour, provenience and other factors permit the provisional association of some bases and finishes; these are noted in the following descriptions.

Both bases and finishes are here subdivided into two major descriptive classes: irregular and regular (Grange 1974: 200). Regular bases have two distinguishing characteristics: they have vertical side walls at the heel and their basal diameters are uniform, or nearly so. Irregular bases, in contrast, exhibit the sag or indentation of the side wall above the heel and have obviously lopsided or irregular basal diameters. Regular and irregular finishes are similarly uniform or lopsided in diameter and uniform or irregular in the shape of the string rim.

The distinction between regular and irregular base forms is of chronological significance. The sagging wall was not eliminated until the Ricketts mould process was adopted (Jones 1967: 33). The process was patented in 1821 (Noël Hume 1969: 61).

Finish and Neck Fragments

Finish and neck fragments of cylindrical wine bottles are sescribed in the following section. See Table 4 for dimensions.

Irregular Finishes

Type 1 is an irregular two-piece string rim with a deceptively convex neck profile (Jones 1967: 12) which is mainly parallel-sided and incurved just below the string rim. The string rim is flat to slightly downtooled and the lip downtooled to V-tooled in section. The lip is larger in diameter than the string rim. The metal is light olive colour (10Y 5/5) and the specimen retains a trace of a rounded shoulder (see Figs. 35a; 40a). The string rim and neck form is similar to that shown as type 9 of 1795-1800 (McKearin and McKearin 1948: Pl. 221), type 21, 1770-1800, and type 26, 1750-80, (Noël Hume 1961: 101).

Type 2 has an irregular finish with a straight neck which is slightly convex at the top (deceptively convex). The string rim is narrow and flat and the diameter of the lip is larger than that of the string rim. The lip is downtooled over the string rim (see Figs. 35b; 40b). The metal is moderate olive brown (2.5Y 4/4) and the remnant shoulders of the specimen are rounded. This finish is probably associated with a specimen from the same provenience of base type 4 which has a quatrefoil pontil mark. The specimen is similar to type 11, 1820-30 (McKearin and McKearin 1948: Pl. 221).

Type 3 is an irregular but incomplete finish with a convex neck. The downtooled string rim is slightly larger in diameter than the downtooled lip. The metal is moderate yellowish brown (10YR 4/4). The specimen is similar in form to type 11 (McKearin and McKearin 1948: Pl. 221) of the 1820-30 period (see Figs. 35c; 40c).

Type 4 (see Figs. 36a; 40d) is the neck and shoulder of a bottle with a deceptive convex neck profile and an irregular finish. The shoulder is rounded. The wide, string rim is flattened and irregular. The lip is larger in diameter than the string rim and is beveled; its base is larger than the top, giving the finish an angular profile. The metal is moderate, yellowish brown (10YR 4/4). This finish is probably from a lot which included a base with a sand pontil mark and quatrefoil push-up impression. It is similar in form to type 11 (McKearin and McKearin 1948: Pl. 221) dated 1820-30 and type 22 (Noël Hume 1961: 101) dated 1790-1820. This specimen is probably a variant of the specimens described below as number 5.

Type 5 specimens have deceptively convex necks. Extant shoulders are rounded. The string rim is applied and flattened to slightly downtooled. The lip is larger in diameter than the string rim and downtooled to a beveled, rounded form. The interior of the lip is outflared. The metal is light olive (7.5Y 5/5). One finish is probably associated with a quatrefoil push-up marked base while another may be related to an irregular base with a conical push-up with a small diameter rod impression. These specimens resemble type 11 dated 1820-30 (McKearin and McKearin 1948: Pl. 221) and type 22 (Noël Hume 1961: 101) dated 1790-1820 (*see* Figs. 36, *b*, *c*; 40*e*.)

Regular Finishes

Type 6 specimens are the most frequent variety found in these excavations; they were probably made by a finishing tool. They belong to the regular finish form class and have two-piece finishes with convex necks (Jones 1967: 13). The string rims are smaller in diameter than the lips. Both string rim and lip are characterized by relatively uniform diameter and profiles, and exhibit horizontal parallel striations around the finish. The mouths are round and the interior lips are straight-walled. One or two specimens exhibit glass drips or slight irregularities below the string rims, but the general appearance is a regular one. The string rims are flattened to slightly beveled while the lips are beveled to rounded in section. Aside from the greater regularity, these specimens resemble those described immediately above (5). Metal colours include light olive (7.5Y 5/5) and moderate olive (5Y 4/3; 7.5Y 4/3; 2.5Y 4/4, 5Y 5/6).

One specimen appears to be the neck of a partly restorable bottle with a rounded shoulder; the base has a push-up impression of a small diameter rod and a sand pontil mark. The specimens resemble type 11 (McKearin and McKearin 1948: Pl. 221) dated 1820-30. (*See* Figs. 37*a*, *b*, *c*; 40*f*, *g*.)

One neck fragment of particularly short and bulbous convex form (type 7) is worthy of note. A trace of its string rim remains but cannot be classified. It appears to be of the regular class. The metal is moderate olive (5Y 4/3).

Some regular finish specimens have convex necks and a high collar-like lip above a narrow beveled string rim (type 8) (Figs. 38*a*; 40*h*). They may resemble type 12 (1840-60) but could be *a* variant of type 11 (1820-30) (McKearin and McKearin 1948: Pl. 221). The metal is moderate yellowish brown (10YR 4/4) to moderate olive brown (2.5Y 4/4).

One finish, a type 9 regular class specimen, is slightly rounded and has a sharply outflared beveled string rim. The string rim is larger in diameter than the lip (Figs. 38b; 40i). The metal is moderate olive brown (2.5Y 4/4) and the neck shows evidence of moulded manufacture.

One type 10 regular neck example has a convex profile and a vertical mould seam from lip to shoulder where the specimen terminates. It has a rounded V-shaped string rim and high collar-like lip. The metal is moderate olive brown (2.5Y 4/4) (Figs. 38c; 40j). The string rim resembles types 23 (Noël Hume 1961: 101), dated 1814-53, or even type 13, dated 1865-75 (McKearin and McKearin 1948: Pl. 222).

Type 11 regular finish has a string rim which is applied and irregular. The lip is smoothed but has some indentations in it. The mouth is regular and of uniform diameter. The neck is incomplete but appears to have been straight-sided (Figs. 39a; 40k). The metal is light olive (7.5Y 5/5).

Another regular finish (type 12) also has a slightly irregular applied and flattened string rim. The lip is beveled upwards to the mouth. The lip is the same diameter as the neck; only the string rim protrudes. The metal is light olive (10Y 5/5). This specimen may be of the Champagne bottle form of the 1870-1920 period (Toulouse 1969). (See Figs. 39b; 40l).

Type 13 regular finish has a regular lip but an irregular string rim. The neck is of deceptively convex profile with generally parallel sides incurved just below the string rim. At the bottom of the neck it expands into a gently sloping champagne bottle shoulder in contrast to the rounded shoulders on previously described specimens. The lip is outflared and slightly rounded, the mouth is slightly oval. The applied string rim is downtooled and an irregular blob of glass extends up onto the finish in one place. The general appearance is of the regular form but with some irregularities making the specimen difficult to classify. The metal is light olive (7.5Y 5/5). (See Figs. 39c; 40m.)

Another distinctive neck fragment (type 14) also has the sloping shoulder form and is of especially thin metal. No trace of finish or string rim is present. The metal is greenish yellow (10Y) and irridescent. The specimen may be related to a base of similar colour.

Base Fragments

Irregular Bases

Type 1. One fragment of a bottle base consists of the upper part of a rounded, conical push-up; the remainder of the base is missing and the specimen cannot be fully classified. At the top of the push-up are some barely perceptible indentations, possibly from a quatrefoil tool (Jones 1971: 66). A circular pontil mark 33 mm in diameter is also present about 10 mm below the push-up impression. The pontil scar consists of a circle of glass, probably from a glass-tipped pontil (Jones 1971: 60). The metal is dark greenish yellow (7.5Y 6/7).

Type 2. One irregular base has a uniform basal diameter but a slightly sagging side wall above the heel. On the interior the wall push-up angle is U-shaped. The push-up is a bell-shaped form and at its top traces of a circular glass scar from a glass pontil are present. The metal is greenish yellow (10Y) and irridescent, and on this basis the base may be associated with the neck fragment of a slope-shouldered bottle (type 14 above). (See Fig. 41.)

Type 3. One bottle base fragment of irregular form has the sagging side wall above the heel. The exterior surface has a pebbly texture. On the rounded heel, from the resting surface to the beginning of the indentation or sag, are two parallel ribs 15 mm long and 8 mm apart. (See Fig. 41b). These raised lines are moulded surface features possibly intended to balance the bottle as it lay on its side (Jones 1967: 21); this is a rare trait (Jones: pers. com.). Similar to the other bases with sagging side walls, this specimen fits that of the bottles from Ile-aux-Noix of 1770-1810 (Jones 1967: 33). The push-up is incomplete but was a low-domed form with evidence of a sand pontil (Jones 1971: 70) of 18th-century form. The interior wall push-up angle is V-shaped. The metal is moderate olive (5Y 4/3).

Type 4. A common variety of the irregular bottle base has a conical push-up with traces of a quatrefoil impression at its top. Traces of glass and sandy roughening on the sides of the push-up indicate the use of a sand pontil (Jones 1971: 70). The side walls are sagged above the rounded heel and the exterior surface has a pebbly texture (see Fig. 41c). The resting surfaces are often scratched from repeated use. The interior wall push-up angles are V-shaped. The metal is most often light olive (7.5Y 5/5; 5Y 5/5; 10Y 5/5) but one moderate olive (5Y 4/3) example is present. One specimen is probably associated with a finish of type 2 as described above. The dimensions of these and other bottle bases are listed in Table 5.

Type 5. Another fairly common variety of irregular base also has the pebbly exterior surface texture but is distinguished by a conical push-up with a circular push-up impression made by a small diameter rod. The push-up walls bear traces of sand pontil rings. Two have irregular protrusions on the side of the push-up and their push-ups have a lopsided, conical form. One example with a cluster of fitting bodysherds shows evidence of a rounded shoulder and a neck finish of regular type 6 as described above. A second base may be associated with a type 5 finish on the basis of the bluish colour of the metal. All of these bases are slightly irregular in diameter. In most, the interior wall push-up angle is V-shaped but two examples are U-shaped. The metal is mostly light olive (5Y 5/6; 7.5Y 5/5) but one moderate olive (5Y 4/3) specimen is present. (See Figs. 41d, e).

Regular Bases

Type 6. Two regular base specimens have straight side walls above the heel. The exterior surfaces are pebbly in texture. The push-ups are conical and have a small diameter (8 mm) tool impression at the top. These bases lack clear evidence of pontil scars. The basal diameters are uniform (Fig. 41f). The metal is moderate olive brown (2.5Y 4/4) and moderate yellowish brown (10Y 4/4).

Type 7. These regular base specimens have straight side walls above the heel. The basal diameters are nearly uniform but have slight irregularities. The exterior surfaces are pebbly. The push-ups are conical and have a small diameter (16 mm) tool impression in the centre. There is also a ring-like pontil mark with the sandy texture of a sand pontil (Fig. 41g). Like type 6 above, these specimens have push-up treatment features similar to the irregular bases but differ in having the straight side walls. The metal is moderate yellowish brown (10YR 4/4) to moderate brown (7.5YR 4/5).

Fragments of another straight-sided bottle base with a trace of a high push-up of indeterminate form are also included here. The metal is very light yellowish green (2.5G 9/3) and irridescent.

Type 8. One of three varieties of regular bottle bases with evidence of a moulded push-up, these specimens have mostly uniform basal diameters although some slight irregularities are present. Like the other straight-sided examples, the vessel side walls are slightly larger in diameter than the heels, an attribute which would make mould removal easier. The push-ups are low, conical in form, and are distinguished by the presence of a ridge of glass between the resting surface and the top of the push-up. The ridges are closer to the resting surface and are nearly uniform in diameter. They have the appearance of a moulded ridge and are interpreted as a base mould impression. The interior angle is V-shaped. The metal is light olive (10Y 5/5) (Fig. 41h).

Type 9. One fragmentary base with a straight side wall has a remnant of a low-domed and slightly flattened push-up (Fig. 41i). The surface of the push-up is pebbly and distinctly dull, but there are no tool marks or pontil scars on the surface. The interior angle is a broad, almost L-shaped, form. The metal is moderate olive (7.5Y 4/3).

Type 10. One base with straight side walls has a very low, rounded or slightly domed push-up and a broad, flat resting surface (Fig. 41j). There are no tool marks. The push-up was probably moulded. The metal is moderate yellowish brown (10YR 4/4). The push-up is 53 mm in diameter. It lacks moulded lettering around the edge, but otherwise resembles moulded bottle bases of the 1835-42 period which have been seen in Florida sites (Olsen 1965: 105-7).

Bodysherds

Six hundred and seventy-six (676) bodysherds of cylindrical glass bottles were recovered from the excavations. Many of these are associated with base or neck fragments described above and are thus parts of partially restorable bottles. Other sherds could not be associated with finish or base fragments. In some cases it is possible to determine if the bodysherd came from a regular form with a straight side wall or from an irregular form with a sagging side wall.

Miscellaneous Bottles

Square-Sectioned Base

The base of a large, square-sectioned bottle is of moderate olive-coloured metal (7.5Y 4/3). The side panels are slightly sagged above the heel and the bottom is slightly domed on the interior. On the exterior of the bottom is an indented pontil mark 54 mm in diameter. It has a concentric swirl-like pattern and a pebbly surface texture, probably from a sand pontil. The vessel is 84 mm by 85 mm in maximum dimensions (see Fig. 42).

Octagonal-Sectioned Bodysherd

One bodysherd of an octagonal bottle or square bottle with chamfered corners includes one large panel and one narrow corner panel. It is a very pale green metal (7.5BG). On the flat side panel, the moulded letters ----OE---- are present but the traces of the preceding and following letters are too fragmentary for an accurate interpretation. The preceding letter could be the side of an H and the following letter, the upper corner of an M or an N.

Small Square-Sectioned Bottles

One side of the base of a square-section bottle with flattened corners is of bluish green (2.5BG) metal. One side panel bears moulded letters ----N. The N is at the base of the bottle and must be the terminal letter. A trace of a curved, adjacent letter could be part of an O. The word could be London, and the specimen a mustard bottle, a type common at Fort Lennox (Jones: pers. com.). The bottom of the bottle bears a diagonal mould seam below a circular glass chip pontil scar.

Another square-sectioned small bottle fragment is the base of a pale green (7.5BG) metal specimen. The corners are slightly flattened. The small remnant of the side panel bears a trace of an inset moulded panel form. The bottom of the specimen is a slightly domed push-up with a trace of a cylindrical glass pontil scar, from the blowpipe used as a pontil (Jones 1971: Fig. 14).

Miscellaneous Bottle Finishes

A rim fragment of a large mouth bottle of pale green colour (7.5BG) has a finish formed by folding the glass to establish a plain narrow collar-like rim.

A finish of a bottle neck of pale green (7.5BG) metal has a narrow string rim with flown glass traces at its base and surmounted by a tapered lip. The base of the lip is larger in diameter than the string rim and the mouth diameter is smaller than the bottom of the lip. Dimensions (in mm): string rim diameter, 23; finish diameter, base, 24.5; finish diameter, top, 20; interior mouth diameter, 15; finish height, 10.5; string rim height, 7.

Another finish of pale green metal (7.5BG) consists of a short neck and a tapered collar-like finish of the castor oil form (Walker 1971: 168). A flow of glass is present on the neck below the finish. Dimensions (in mm): neck height, 20; neck diameter, 22; finish diameter, base, 25; finish diameter, top, 21; interior diameter, 14.5; finish height, 13.

Wide-Mouth Neck Sherds

Three fitting fragments of a low-necked wide-mouthed bottle were found. Their metal is moderate olive (5Y 4/3). The sherds bear traces of a thickening above the neck, but the finish is missing. The estimated neck diameter is 38 mm.

Flanged Finishes

The neck of a small bottle with a narrow flanged finish is present. The metal is moderate brown (7.5YR 4/5) and the neck is 20 mm high and 18 mm in diameter. The flanged finish is fragmentary. The vessel had a round shoulder.

A fragment of a clear metal pharmaceutical bottle with a short neck and a flaring flanged finish was found. The finish is an estimated 22.5 mm in diameter and the neck is 8 mm high.

Modern Glass

A number of specimens of recent origin were also recovered. These were probably derived from the most recent occupation of this area of the site when it was used as a campground in the years just prior to the archaeological excavations. They were nearly all recovered from the sod level.

Two clear glass sherds are body fragments of a cylindrical soft drink bottle.

Three moulded shoulder sherds are from a soft drink bottle. The metal is clear and has converging moulded rib decorations and the partially complete moulded words CANADIAN ..TTLERS ASSOCIATION LT. REGISTR....

Four thin moulded shoulder sherds may have parallel ridge decorations. They are probably from a single bottle.

Two curved to flat paneled bodysherds, one plain and one with a moulded ridge decoration are probably from a syrup bottle.

One half of a clear bottle base has traces of a moulded ridge. It may be part of the syrup bottle mentioned above. It is ovoid with flat ends. A moulded 7 and a trace of a triangular design is on the bottom. It is probably from a Consumers Glass Company bottle (Jones: pers. com.).

One clear base fragment is part of a cylindrical bottle with a low-domed basal indentation.

Several cross-mending fragments form the shoulder and finish of a square-sectioned moulded bottle. It has a screw top closure. The metal is moderate yellow green (5GY). On one side the moulded letters DE---- remain. The vessel has a short neck surrounded by a thickened collar which serves as a basal stop for the closure. The finish has moulded screw threads.

Three bodysherds, probably from the same vessel, are light olive (7.5Y 5/5). A vertical mould seam is present on one side wall and a similar mould seam is on the rounded shoulder. The body diameter is 78 mm.

One moderate olive (10Y 4/3) fragment of a cylindrical bottle was also found.

Bottle Glass Summary

The bottle glass fragments primarily fall into a class defined by Jones (1967) from another collection of specimens recovered from excavations at Ile-aux-Noix. This type represents cylindrical green glass "wine" bottles probably manufactured in the period 1770 to 1821. In addition, a few specimens bear traces of post-1821 moulded manufacturing techniques. A small number of modern glass specimens were recovered from the sod level and represent the most recent occupation when the site was used as a campground.

Since the redoubt and blockhouse were demolished in 1813 to make way for the naval shipyard, these specimens could come from either the occupation of the redoubt or from the subsequent periods of use of the area. The specimens of post-1821 manufacture should be exclusively from post-redoubt occupation levels.

The distribution of wine bottle base and finish types is shown in Table 6, in which both blockhouse and redoubt stratigraphic units are listed. The only stratigraphic level producing such specimens in the blockhouse area was the refuse-occupational zone above the foundations - that is, from the post-blockhouse period. Miscellaneous forms such as square-sectioned bottles are not shown in Table 6 because all were recovered from the refuse layer above the foundation level. As already noted, modern glass came from the sod levels.

The only bottle fragments found in a stratigraphic context at variance with their identification and dating are two moulded base specimens (base type 8) which were recovered from the redoubt builders' trench when their post-1821 date of manufacture would indicate that they should not be in such an early level. All other moulded specimens are from the refuse zone above the foundations. It is most likely that these two type 8 base fragments were intruded into the trench adjacent to the foundation wall after the destruction of the redoubt. As previously discussed, there is evidence that the foundations were robbed for structural stone during demolition and it is therefore possible that the trench observed was a demolition trench rather than a builder's feature.

The post-foundation refuse and occupation level must be later than the 1813 destruction of the redoubt and it could be expected to contain bottles of both the earlier irregular form and the later regular variety and the stratigraphic distribution bears out this expectation.

The sample of glass is relatively small, but there was some indication that the regular base specimens (types 6-10) tend to be somewhat browner in the colour of their metal than the irregular specimens. The irregular specimens are most often light olive while the regular ones are somewhat more frequently moderate yellowish brown. This potential difference may be worth further investigation with a better sample of specimens.

Miscellaneous Glass Artifacts

Glass Tumblers

Four moulded clear glass vessel bases, probably tumblers, were recovered. Three have straight sides and rounded heels. The bottoms have a circular, slightly raised domed basal indentation. No corresponding push-up is found on the bottom of the interior. A scratched resting surface ring surrounds the basal indentation which is 45 mm in diameter on one specimen and 32 mm in diameter on another. In the latter case it is not centered. The third specimen is fragmentary. The exterior base diameters are 66 mm and 68 mm.

The fourth tumbler base is a fragment which originally had six flat panels on the vessel sides. The panels are 27 mm wide and slightly concave. The base has a concave indentation on both exterior and interior. The exterior indentation is 39 mm in diameter; the maximum diameter of the base is 60 mm.

One rim fragment of a tumbler has a rounded lip and moulded concave side panels. Traces of two of the round topped panels are present. The glass is clear.

One clear bodysherd appears to be from a tumbler. It has a cylindrical interior but had three flat panels on the exterior. These side panels are slightly concave. The measurable panel is 35 mm wide.

Another possible tumbler bodysherd is also plain or cylindrical on the interior and paneled on the exterior. Remnants of five narrow, flat panels are present on the fragment which is less than half the diameter of the original vessel. The panels are 16 mm wide.

Stemware

Four fragments of wine glasses were recovered. One is a fragment of the bowl but is too small for further description.

One fragment is an edge of the foot. It has a rounded edge and a trace of a concave-convex cross-section.

Another wine glass fragment is the tapering section of a solid glass stem. It is 11 mm in its smallest diameter.

A round knop from a wine glass was also found. It is 19 mm in diameter. On one end is the scar of the upper part of the stem while the opposite scar includes a small portion of the foot. Thus, the knop was near the shaft of the stem.

Stopper Fragment

The top portion of a cut-glass stopper is oval in outline. It was probably from a decanter. The edges of the flat stopper are beveled to a V-shape. Across the centre is a flat to slightly concave oval decorated area across which ten parallel diagonal grooves have been cut. The specimen lacks the stopper base. The stopper's maximum length is 44 mm; its width is 35 mm, and its thickness is 10 mm.

Plate Glass

A fragment of plate glass 5.5 mm thick has a right-angled corner.

Lamp Globe

Three fragments of ground glass are interpreted as parts of a lamp globe. They are smooth on the exterior and opacified by grinding on the concave interior surface. One is a bodysherd while two fragments include portions of a right-angled basal rim. The base lacks the grinding and has a rounded lip. The base is 8 mm high and has an estimated diameter of 80 mm.

Container

A base of a moulded vessel of light yellow green (7.5GY 0/4) may be a part of a pickle jar or other container (Jones: pers. com.). Basal fractures and side wall traces indicate a square body approximately 65 mm in maximum size. The specimen has a high-domed push-up 23 mm high and 42 mm in diameter. Its regularity indicates moulded manufacture as do the mould seams of the resting surface. The mould seam is diagonal from corner to corner across the base.

Object Base

The base of an unidentified glass object is strong purplish blue (7.5PB) and was moulded. The presumably square base was 67 mm in its maximum dimension. It has a rounded projection at each corner. The flat resting surface is scratched from use. The resting surface is on a linear foot 7 mm wide and 11 mm high around the bottom edge of the object. The bottom of the specimen was open and is probably a pedestal foot of a larger object. A trace of a cylindrical side wall projects above the base.

Pane Glass

One hundred and forty-six (146) fragments of window pane glass were recovered from these excavations. The specimens were recovered from the sod level and the mixed refuse and occupational zone. These deposits are all above the foundations of the blockhouse and it is unlikely that these specimens are related to the redoubt or blockhouse structures. The specimens range in thickness from 1.0 mm to 2 mm. A few examples are clear, but most have a greenish hue.

Clay Pipes

A small number of clay pipe fragments were recovered from the excavations in the area of the redoubt. Most are small fragments, but some specimens bearing maker's marks aid in dating the excavation units.

Pipestem Fragments

A total of 113 plain pipestem fragments were recovered. Two specimens have a bore diameter of 6/64 in.; 45 specimens have a bore diameter of 5/64 in.; 65 specimens have a bore diameter of 4/64 in. and one is indeterminate. Applying the Harrington method of estimating date brackets to these fragments in their stratigraphic contexts produces a uniform result indicating that the period represented is 1750 to 1800. The Binford formula method yields dates ranging from 1755 to 1778 for various stratigraphic units. These dates are not particularly useful, being generally earlier than the known historical occupation period of the features from which the specimens were recovered. This is not an unexpected result since the method is known not to work well in this late period (Walker 1968: 99).

Thus, the plain, unmarked pipestem fragments yield little data of use in a chronological study of the stratigraphy in the redoubt area.

Mouthpiece Fragments

Several stem fragments, not included in the previous discussion, were identified as mouthpiece fragments. On 19 specimens, a coating - or traces of a former coating of yellowish brown glaze, was present on the stem (Fig. 43e). One example with traces of a red substance, probably wax, was also thought to be a mouthpiece fragment (Fig. 43d). Glaze and wax are both 18th-century traits (Noël Hume 1970: 302). Original mouthpieces also include unglazed examples with a small diameter, a tear-drop shaped stem cross-section and a trace of a clay ridge around the bore hole caused by the extraction of the wire during manufacture (Fig. 43c). Another original mouthpiece is oval in cross-section and has an enlarged, flattened bit

(Fig. 43a), an unusual trait. Two stem fragments were identified as secondary mouthpieces by smoothing and toothmarks on the end (Fig. 43b). A third secondary mouthpiece (Fig. 43f) consists of a short stem remnant, adjacent to the bowl. The stem has been carved to a tapered form. It is too close to the bowl to have served directly as a mouthpiece and must have been inserted into a reed or other cylindrical tube which served as a pipe stem.

Glazing appears to have been the most common mouthpiece treatment although only a few of the glazed fragments retain the original end of the stem.

Decorated and Marked Stem Fragments

One stem fragment bears traces of a moulded floral design near the thicker part of the stem adjacent to the bowl end. It was probably part of a pipe bearing a moulded design on the bowl.

Thirteen pipestems included portions of impressed maker's name and place marks. These are listed in Table 7. One specimen marked ...DERSON MON..... is probably a Henderson pipe. Montreal firms of this name were active between 1847 and 1876 (Walker 1971a: 25). (See Fig. 44e.)

Another Montreal firm was represented by a single stem fragment marked ..NNERMAN MONTR.... The Bannerman name is associated with Montreal pipes of 1858 to 1907 (Walker 1971a: 25). (See Fig. 44d.)

A third Canadian manufacturer is represented by a pipe stem with the impressed mark W AND D BELL QUEBEC. This firm manufactured clay pipes between 1862 and 1877 (Walker 1971a: 30). (See Fig. 44b.)

A Scottish firm is represented by five specimens bearing the impressed mark MCDOUGALL GLASGOW or portions of those words. That company was founded in 1847 and closed in 1967 (Walker 1971a: 25). In 1891 the place mark was changed from Glasgow to Scotland (Walker 1971b: 3) and thus these specimens probably date before 1891. (See Fig. 44c.)

The most complete example was a stem and part bowl fragment with a bowl angle of 115 degrees and a spur 7.3 mm long and 6.1 mm in diameter. The letters are 2.6 mm high.

Three stems are marked with all or part of the designation A COGHILL GLASGOW; Coghill was a maker whose activity spanned the period 1826-1904 (Walker 1971a: 25). (See Fig. 44a.)

One stem bears traces of a maker, ----LL GLA....; this could be either McDougall or Coghill of Glasgow. A final marked specimen has a single illegible letter (probably ----D).

These specimens all post-date 1826. Their stratigraphic distribution is summarized in Table 8. These pipe specimens could only have been deposited at the site during the period after the establishment of the naval yard and could not reflect the earlier redoubt period. Their presence in stratigraphic units at the site may, however, be an indication of the mixture of late refuse and earlier deposits since they are found within all of the major occupational zones. As in the case of bottle glass, the datable pipe fragments confirm the identification of the major refuse zone as of period 3 origin and a post-redoubt feature.

Bowl Fragments

Of the total of 37 plain bowl fragments which were found, none can be classified according to form. Like the plain stem fragments, they reveal little significant interpretive data.

Spur Fragments

Eleven bowl base fragments with intact spurs were also found. Most are slightly tapered, cylindrical spurs, sometimes slightly flattened or distorted.

Only one example bears a moulded maker's mark, the initials WW appearing on the sides of the spur. There are several makers with these initials in the period 1754 to 1845 (Oswald 1960), any of whom could have made this pipe.

Decorated Bowl Fragments

Two types of decorated bowl fragments were found. One type is moulded with fluted panels (Fig. 45*b*). The four examples have lips 2 mm to 2.5 mm thick. Fluting is a mode of decoration associated with the 1780-1820 period (Noël Hume 1970: 303). The other variety is moulded with traces of a floral and masonic motif, the masonic emblems bearing a central G. Such moulded pipes appear to be of the 1800-30 period (Fig. 45*a* and *c*). Two such specimens were recovered.

One moulded bowl fragment is too small to determine its design pattern.

These specimens could have been deposited during either the redoubt period or during the navy yard occupation after 1813. Their stratigraphic distribution (*see* Table 8) supports the contention that the occupational strata excavated here contain a mixture of artifacts from both periods.

Marked Bowl Fragments

Several pipe bowl fragments are marked. All of these are TD pipes. Three styles of TD markings are represented.

One example, a single specimen, is an impressed mark with the initials TD within an elaborate wreath on the back of the bowl (Fig. 46c). The mark is precise and was made with a sharp implement. The fragment is 1.9 mm thick at the lip of the bowl.

The other pipes are all marked with the simple letters TD on the back of the bowl, but two types are present. In one, the letters are raised or moulded (Fig. 46a). Two fragments retain the raised letter T while one bears the letter D. A larger fragment retains both letters TD. This bowl is 3 mm thick at the lip and had a 110-degree bowl-stem angle. Its spur is 5 mm in diameter and the stem bore diameter is 4/64 in. The letters are 5.1 mm high. In the other fragment, the letters are impressed (Fig. 46b). One impressed marked fragment bears only part of the letter T while a second example bears the letter D which is 4.5 mm high. A third specimen with a 5.1-mm-high letter D intact is 2 mm thick at the bowl lip and has a 105-degree bowl-stem angle. The spur is 5 mm in diameter and the bowl diameter is 5/64 in. The fourth example of the impressed mark retains both letters TD, which are 4.5 mm high. The bowl is 3 mm thick at the lip. The bowl-stem angle is 110 degrees, the spur is 5 mm in diameter and the bore diameter is 5/64 in. (Fig. 46b). One complete bowl has a top nearly parallel to the line of the stem and a small, tapered spur (Fig. 47a). The moulded TD letters are at an angle from the centre line.

Plain Bowls

Three plain bowl fragments are illustrated in Fig. 47. One lacks the top of the bowl and bears a trace of a spur scar on the heel. Its characteristics are: stem, 57 mm long with worn tooth-marked secondary mouthpiece; stem angle, 135 degrees; bore, 5/64 in. It cannot be classified. The others are complete plain bowls. One is a 5.2-mm fragment (Fig. 47b) with a tapered cylindrical spur 5 mm long. Its other characteristics are: lip, 2.3 mm thick; bore, 5/64 in.; Oswald type 12. The other has a plain, spurless heel (Fig. 47c). Its characteristics are: diameter, 20 mm; lip, 4.1 mm thick; briar-like form; Oswald type 12; bore, 4/64 in. Both probably can be included in Oswald's type 12 category of the 1820-70 period (Oswald 1955). It would be consistent with the navy yard period of occupation.

Summary

The pipe data of chronological significance are summarized in Table 8. The pipe fragments date between maximum brackets of 1780 to 1907, a span which encompasses both the occupation of the redoubt and the subsequent navy yard period. Most significantly the specimens from the occupational refuse zone above the blockhouse and redoubt foundations include specimens which indicate that this level must have been receiving refuse deposition at least as late as 1846-47. This is based on the earliest date of the latest type present in these levels. In addition, the time spans of all the dated specimens from these levels either encompass 1813 or post-date that year. On this basis it is apparent that there is little question that the dates for this level are consistent with its stratigraphic position above the foundations of the demolished redoubt and blockhouse. Some of the specimens could be derived from the redoubt occupation period, but most appear to have been deposited after its destruction. Specimens from the builders' trenches are not closely dated but are consistent with the construction period.

Miscellaneous Artifacts

A wide variety of artifacts was recovered during the course of the excavations. Objects made of brass, copper, iron, stone and wood were all included. These specimens are described in this chapter.

The mixed nature of the contents of the stratigraphic deposits in the redoubt blockhouse precludes all but a few associations of specimens and the structural features. Most artifacts came from the blanket of occupational debris stratigraphically above the structural remains. That deposit must post-date the 1813 terminal date for the structures, but its contents may also include specimens from the redoubt occupation as well as from the later navy yard period. Given these circumstances, there is little probability that socially meaningful relationships are reflected by the distribution of these specimens. Nor can significant functional clustering of the artifacts be anticipated. Thus, the following description is presented primarily in terms of the material of manufacture and only secondarily through functional groupings.

Some chronological implications are noted.

Buttons

A small number of buttons were recovered, most of them plain.

Glass

One opaque white glass button with four holes is 11 mm in diameter and 3.6 mm thick. It was from the refuse zone in the blockhouse.

Brass

A brass button of concave-convex cross-section is 16 mm in diameter and 0.8 mm in thickness. It has four holes 2.8 mm in diameter. On the concave side a rouletted wreath surrounds the holes. It is from the refuse zone in the blockhouse area.

A plain brass specimen 17.2 mm in diameter and 1.0 mm thick has a plain face with a slightly beveled edge. An eye was affixed to the centre of the back, but its stump is obscured by a layer of mortar adhering to the surfce. The button was probably dropped into one of the foundations during construction (see Fig. 48b). It was recovered from the refuse zone in the blockhouse.

A third brass button also has a plain face. It is 19 mm in diameter and 1.0 mm thick. A wire loop shank is cast in a central boss on the back (see Fig. 48c). It was recovered from a mixed sod and refuse layer in the redoubt excavations.

Another plain-faced brass specimen is 21 mm in diameter and 0.9 mm thick. The wire shank was soldered to the centre of the back (Fig. 48f). The back of the button bears a raised wreath around the edge and the words LONDON BEST. The specimen was recovered from the refuse zone in the blockhouse; it is similar to South's type 18, 1800-65 (South 1964: 120).

A final example of a plain-faced brass button is 16 mm in diameter and 0.8 mm thick. Its loop eye was cast in a very small boss (Fig. 48d). The specimen was found in the backfill.

White Metal

A moulded pewter button is 20.6 mm in diameter and 6 mm thick. The face is plain and flat. The back bears a mould seam and has a wire shank cast in a central boss (Fig. 48e). The specimen was recovered from the refuse zone in the blockhouse area; it is similar to South's type 8, 1726-76 (South 1964: 117).

Two-Piece Brass

One two-piece brass button (Fig. 49a) has a high domed face. The central decoration on the face is an embossed crown. Around the perimeter of the face, also in relief, are the words PROVINCIAL CAVALRY. The face is crimped over the back. There is a brass loop eye (shank) in the centre and around the perimeter of the back are the incuse stamped letters FIRMI-STRAND LONDON. The specimen is 20 mm in diameter and 11 mm thick. It was recovered from the refuse layer in the redoubt excavations.

A second two-piece brass button is 22 mm in diameter and 6 mm thick. The perimeter of the face is plain, but there is a relief design in the centre. It consists of a seven-pointed star; at the top of the star, in place of an eighth point, is a crown. The bases of the star points surround a narrow belt on which are the words MEDICAL STAFF while in the centre of the button is a monogram of interlinked letters: VR. (Fig. 49b). The specimen was found in the refuse zone in the redout excavations.

These two specimens are similar to South's type 27 1837-65 (South 1964: 123). They are significant in the chronological interpretation of the stratigraphic zone in which they were found; their dating on the basis of form indicates deposition during the period after the blockhouse was demolished. This is consistent with the interpretation of the stratigraphy and of other datable artifacts.

Miscellaneous Metal Objects

A wide variety of miscellaneous objects were also recovered in the excavations. These specimens are described below grouped by material of manufacture or general function, where possible.

Brass Artifacts

Two brass objects are probably leaves from a shako chin strap (Jelks 1973: Figs. 87, 85). One is D-shaped, the other D-shaped with an indented edge. The metal is 4 mm and 5 mm thick and the specimens are 17 mm by 25 mm and 25 mm by 31 mm in size.

Copper Artifacts

One copper specimen is a thin strip cut in a gentle S shape. It is 84 mm long and 5 mm wide. The metal is 0.7 mm thick. It is probably a scrap of waste copper sheet.

A bent piece of copper 2 mm in diameter and 30 mm long is curved at each end. Its regularity suggests it might be part of a copper buckle, but it is unidentifiable.

A square nail of copper 2 mm by 2 mm in size and 36 mm long has a square head. The point is bent at right angles to the shaft.

A copper tack 8 mm long has a flat head 6 mm by 7 mm in diameter. The head is offset to one side of the shank and is oval in outline.

A twisted mass of copper sheeting has several nail holes or other perforations within it. Overall dimensions are 180 mm by 55 mm and the metal is 1.0 mm in thickness.

Lead Buzzer

An oval disc of lead 30 mm by 32.5 mm in size and 2 mm thick has two small central perforations 11 mm apart. A string looped through these two holes would convert this specimen into a buzzer or noisemaking toy (Fig. 50a).

Pewter Object

An unidentified fragmentary object of pewter is generally rectangular in outline, but of irregular dimension, tapering to a narrow, flat shank or tang at one end. Irregularities in the metal protrude from the tang. The specimen could be a fragment of a fork or spoon, or merely a bit of casting waste. It is 58 mm long and 22 mm wide, with the tang tapering to 14 mm wide. Thickness varies from 4.2 mm to 7 mm.

Lead Ball

One lead musket ball of 11/16-in. diameter (.69 cal.) was found.

Cannonballs

One complete solid iron shot has a diameter of 60 mm. A mould seam is visible around the equator. The specimen's weight is 1.0 lb., 14 oz.; it can be interpreted as a two-pounder ball.

One fragment of a large-diameter hollow iron mortar shell was recovered. This fragment is irregular, about 100 mm by 120 mm in size, and 35 mm thick. The small fragment weight is 3.5 lbs. and the specimen is probably from a large mortar shell.

One fragment of a hollow shell is 85 mm by 100 mm in size and 20 mm thick. The small fragment of the larger ball weighs 1.75 lbs.

Three examples of small solid shot were made of cast iron, possibly representing ammunition for small swivel guns of up to a one-pounder size. Such armament would be expected in the blockhouse. One specimen was 42 mm in diameter and two were 63 mm in diameter.

Two solid iron cannonballs are of the same calibre. They are 60.7 mm (2.25 inches) in diameter. One specimen weighs 1 lb. 13 oz., the other weighs 1 lb. 12 oz. The specimens probably were ammunition for a two-pounder gun.

Bayonet

One fragment of a bayonet was identified. It is the socket end and is 104 mm long and 28 mm in diameter. The bottom of the socket has a rolled-edge reinforcing collar. There is an offset locking slot in the side of the cylindrical socket. Opposite the rolled or finished socket end the curved, round elbow of the blade is present. The remainder of the blade is missing (Fig. 51). The specimen resembles those seen on British "Brown Bess" muskets in museum collections and illustrated by Noël Hume (1969: Fig. 3).

Forks

Another iron specimen is identified as the end of a spoon or fork handle. It is flat, has tapering sides and terminates in a wider and rounded end. The total length of the fragment is 91 mm (Fig. 52a).

Two fragments of iron forks were recovered. They have different hafting forms.

One specimen has three tines and a round shank with a slightly bulbous centre 7 mm in diameter. This terminates in a disc-like stop, beyond which is a cylindrical tang 8 mm in diameter and 38 mm long, for insertion into a socketed handle (Fig. 52b).

A second fork has two tines and a slightly bulbous shank 6.5 mm in diameter. The shank terminates in a flattened, expanded plate 2.5 mm thick, 18 mm wide and 75 mm long to which handles of bone or wood were once affixed by means of the remaining rivet studs (Fig. 52c).

Iron Boot Cleats

Boot heel cleats of horseshoe shape are present. One incomplete specimen is 49 mm in maximum width. It is of metal 7 mm wide and 2 mm thick. Four rectangular attachment holes are present.

A larger specimen is complete with a maximum length of 66 mm and width of 72 mm. It is of iron, 11 mm wide and 6 mm thick. One side is flat; the other slightly grooved with traces of at least five rounded perforations for attachment with small-diameter nails.

A U-shaped iron cleat for a boot heel is 73 mm long, 75 mm wide and 5 mm in thickness. Similar specimens have been found elsewhere on the site (Grange 1974: 273).

Tools

A fragment of an iron rake head consists of a rectangular bar 23 mm wide and 8 mm thick. It is 165 mm in length but is incomplete. Six rectangular tapered teeth at 30 mm intervals are attached by insertion through holes through the bar and riveting on the reverse side. The teeth are 65 mm in length (Fig. 53).

A tapered, iron specimen may be the tip of a pick blade but cannot be positively identified. It is 20 mm by 21 mm in its rectangular section, but tapers to a blunt point. The fragment's overall length is 59 mm.

Two fragments of iron appear to be hafting devices. One is 200 mm long and 30 mm wide. It is concave-convex in section. One end is broken across an attachment hole; the other end is broken and twisted. It appears to be one-half of an iron haft for a shovel or other tool.

The other haft is a U-shaped section of iron with a rectangular outline. Its overall dimensions are 45 mm by

70 mm. Made of a single piece bent double, the bend forms a 15-mm-diameter opening which apparently fit around a cylindrical object. The remainder has three attachment perforations, two of which retain nails bent over; the pressure from these attachments would have held, for example, a wooden rod in the rounded portion.

Among the specimens identified as tools was a flat, rectangular blade of a carpenter's plane. The cutting edge is beveled and there is a hole in the centre of the blade 71.5 mm from the beveled edge. The butt end opposite the blade is tapered. The entire blade is 125 mm long, 63 mm wide, and 4.5 mm thick (Fig. 54b).

A narrow iron file of plano-convex cross-section was also found. It is 136 mm long and 11 mm thick. At one end it tapers to a narrow, flat tang 30 mm long and 5 mm wide.

A larger flat file with a rectangular cross-section is 7.9 mm thick. The specimen is 234 mm long and 30 mm wide. It has a 65-mm-long tang 9 mm wide at one end. The cutting grooves of the file blade are still present in places.

Handles

Two specimens have been identified as iron wire handles formed by bending 5-mm-diameter wire rods into an oval shape. One specimen is bent apart and distorted; the other is 92 mm long and 59 mm wide (Fig. 55a).

A heavier iron rod fragment is also tentatively identified as a handle. The rod is 11.5 mm in diameter but tapers to a 5-mm-diameter point. The specimen is incomplete. It is curved, and at the tapered end is bent back on itself and twisted to form an end loop (Fig. 55b).

One specimen is an iron handle in T-shaped form. The handle bar tapers from 14 mm to 12 mm in diameter. Its centre is rectangular in section and 15.5 mm in size; here a rectangular strap iron fitting attaches to the handle through a slot. The fitting, at right angles to the handle, is 16 mm wide and 5 mm thick. It is curved in a large arc and then recurves in a small terminal arc forming an irregular S outline. The smaller arc probably fit into a slot or loop so that the handle could be used to lift or pull a heavy object (Fig. 56).

Scissors

A small, incomplete fragment of scissors has incomplete finger loops. One is about 21 mm by 25 mm; the other is not measurable but may have been larger.

Drawing Link

An irregularly shaped iron specimen is a rod 10 mm in diameter which has a flat, wide end and slightly inward pinched sides that terminate in a narrower, rounded end. A crossbar rod bridges the centre at the narrowest point (55 mm wide). The widest end is 75 mm wide and the overall length is 103 mm. The narrow, rounded end is slightly pointed on the exterior and worn or grooved on the interior, suggesting that this end was used to pull on or to take some strain which has worn and distorted the end. The broader end could have held a leather strap.

Hooks

Another small, tapered iron fragment may be the point of an iron hook.

An eye bolt of large size was also found. The shank is 16 mm in diameter and the overall length of the specimen is 147 mm. An eye has been formed by bending the rod at one end; it is not quite closed. The eye is 45 mm in diameter on the outside with a 20-mm-diameter opening.

Cleat

One half of an iron cleat for attaching a rope to a structure was recovered. It has a central, flattened area with an 8.5-mm-diameter hole in it; the end is broken off. The opposite end is bent up and tapers to a round bar with a rounded end; this arm is parallel to, but above the flattened central attachment. The fragment is 110 mm long. The rod is 10 mm in diameter (Fig. 54a).

Latch

A complete latch was recovered. The specimen consists of a base plate 35 mm wide by 12 mm, and U-shaped loops through which the latch bar slides. The latch bar is 225 mm long and 15 mm by 7 mm in size. One end tapers to a blunt, offset point. Behind this end the underside of the bar is constructed to form a spring creating a tight fit under one U-shaped loop. On the top side of the bar are protrusions which serve as stops, one of which is between the U-loops and one behind them. At the other end, the bar curves to terminate at a 90-degree angle to the shaft and the end of the vertical terminal is a flat disc handle (Fig. 57).

Hinges

One T-hinge consists of a long, tapered strap with a T-bar at its wide end. The strap is 38 mm to 15 mm wide and 2 mm in thickness. It has four holes, two of which retain nails. The strap is 205 mm long. The shorter bar is 125 mm long and 25 mm wide.

One strap hinge fragment is the tapered end of a strap with a rounded tip. A single perforation is present in the centre of the rounded end. The narrowest width of the strap is 12.5 mm while the rounded end is 28 mm in diameter. The metal is 6 mm thick and the fragment is 110 mm long but incomplete.

Another strap hinge specimen is complete. Like the one described above it terminates in a tapered section with a rounded end. There is a single perforation in the rounded end. The body of the strap is parallel-sided and has two attachment perforations. The tapered portion is the last 100 mm of the hinge which has an overall length of 250 mm. The metal is 4.5 mm thick. At the proximal end the metal is doubled back on itself and is 9 mm thick. The doubling creates a looped end 23 mm in diameter with a 12-mm-diameter perpendicular gudgeon hole for mounting over a pintle.

Two rectangular leaf hinges were found. Overall dimensions of the largest specimen are 87 mm by 90 mm, each half being 45 mm. Each leaf has three attachment perforations. The metal is 2 mm thick.

The smaller leaf hinge is 53 mm by 77 mm in size, each half being 26.5 mm wide. The metal is 5 mm thick and each side has three attachment holes. One retains a nail.

An unmeasureable fragment of a leaf hinge was also recovered.

An iron pintle hinge, probably a shutter hinge, has a tapered, rectangular sectioned tang and a cylindrical pintle at right angles to the tang at one end. The tang is 120 mm long. The pintle rod is 13 mm in diameter and 43 mm long.

Chain

One fragmentary chain link is made of iron rod 11.5 mm in diameter.

Jew's Harp

A Jew's harp with a looped end and parallel shanks is among the iron specimens. It is 54 mm long and the loop is 22 mm by 28 mm in diameter (Fig. 50b).

Riveted Rooves

Two riveted rooves have small, rectangular iron plates through which a nail passes and is riveted to the rectangle. One plate is 18 mm by 22 mm in size and 1.7 mm thick. The other is 30 mm by 33 mm in size and is 5.5 mm thick. The 65-mm-long rivet is 7 mm in diameter.

A twisted piece of strap iron may have been a large strap. Its tang-like ends are twisted, possibly in the removal of the iron from another object.

Cast-Iron Pot Rim

One fragment of a cast-iron pot is of 3.5-mm-thick metal. It has a rounded rim bead 8 mm in diameter. The estimated vessel mouth diameter is 140 mm.

Iron Object

An iron wire object is made of wire 3.5 mm in diameter. The fragment is 170 mm long. At one end it terminates in a rectilinear U-shaped holder 9 mm wide and 22 mm long. The tip of the U-shaped holder is bridged by a rivet; the object was attached by the rivet and U-shaped holder to some other object.

Tanged Rod

A tanged iron rod 13 mm in diameter and 253 mm in length terminates in a flattened tang at right angles to the rod shaft. The tang is 65 mm long, 15 mm wide and 8 mm thick. It curves to a point.

Iron Rods

Three tapered iron rods are 205 mm long and 11, 12 and 13 mm in diameter, tapering at one end to 8-9 mm diameters. Their function is not clear; they may be drift pins.

Three additional iron rod fragments range from 7.2 mm to 9.2 mm in diameter. Their function is unknown.

Long Rivet

A long rivet has a rectangular-sectioned shank 6 mm by 6.5 mm in size. It is 115 mm in overall length and has a flattened, riveted head at each end.

Bolt and Nut

A bolt 66 mm in length has a round head 21 mm in diameter. Its shank is rectangular in section and 9 mm by 10 mm in size. The lower 31 mm of the bolt is 9 mm in diameter and threaded. The nut is 21.5 mm by 22 mm and 10.5 mm thick.

Washers

Two iron washers were identified. One is 2.4 mm thick and 38 mm in exterior diameter. It has a 22 mm hole in the centre.

The second washer is 7.7 mm thick, 41 mm in exterior diameter and has a 22-mm-diameter central opening.

Miscellaneous Iron Objects

An iron tube made of a thin sheet of rolled iron is broken off at both ends. It is 96 mm long and 7.5 mm in diameter. An iron bolt 5.6 mm in diameter and 51 mm (2 in.) in length was also recovered. It has a rose head.

Several iron rods probably used in building construction were found. All are fragments. They range from 21 mm to 215 mm in length and from 7.6 mm to 18.1 mm in diameter.

A tapered strap iron hoop from a small cask or other object was recovered. Bent out of shape, its present diameter ranges from 120.6 mm to 133.3 mm. The strap is 20.4 mm wide and 2.3 mm thick. The ends overlap for 42.4 mm and are joined by a rivet. The diameter across one edge is larger than across the other edge, forming a tapered hoop.

A large iron staple of 5-mm-thick metal was found. It is a rectangular U-shape, 53 mm wide and 72 mm long. The head is rectangular in section; the sides taper to points for attachment.

A J-shaped iron object may be a fragment of a large staple.

Several irregular unidentified iron objects of various dimensions were also found.

Iron and Lead Object

One fragmentary specimen appears to be a section of an iron container with an irregular piece of lead attached. One end of the iron is curved, but its side appears to be straight. It is unidentified.

Riveted Strap Iron

One example of riveted strap iron is 30 mm wide and of 1.5-mm-thick iron. Two pieces 160 mm long overlap one another and are fastened together by a rivet.

Another example of riveted strap iron consists of two overlapped strips joined by a rivet. The end of one strip at the joint is rectangular in outline while the end of the other tapers to a rounded tip just beyond the rivet.

Other perforated or riveted strap iron fragments were also recovered. There were ten such specimens.

Plain strap iron specimens lacking perforations or rivets were also present. There were 24 such specimens.

Tin Box Fragments

Thin tin fragments may be parts of boxes. Fifteen fragments found in one group may be parts of a single box. The metal is 0.8 mm thick.

One specimen 0.8 mm thick has the letters MILL---- around the rounded edge. It could belong to the group above.

Another tin fragment has a lead bead around its edge. The tin is 1.0 mm thick.

Sheet Tin

A total of 409 sheet tin fragments were recovered. These are identified as roofing tin. They are frequently bent or folded and have nails driven through them.

Iron Wire

Two small pieces of iron wire were found.

Scrap Iron

Seven specimens were classified as scrap iron.

Modern Tin Cans

Twelve specimens were identified as modern tin cans. One was a sardine can with the opening key attached. These specimens were probably deposited on the site when this area was in use as a campground in recent years. Ten specimens were from the sod level and two from the mixed refuse zone above the structural remains.

Nails

A total of 665 iron nails or nail fragments were recovered. Only 14 of these were associated with structural remains or a builder's foundation trench. The remainder were recovered from the sod layer and the general refuse zone above the structural remains. The nail fragments are therefore mostly associated with post-redoubt/blockhouse strata, but that level could contain some specimens originally used in those structures.

The specimens were classified according to cross-section and size; additional analysis was not undertaken because the lack of a good structural association precluded useful interpretation. Spikes have large, thick shanks ending in square heads with beveled edges. Square-sectioned nails are almost all rose-headed with four hammer facets. Some clout heads were noted but the field classification did not record this detail. A smaller number of clinch nails with spiraled shanks were found. The least common variety of nail had a rectangular cross-section and it is notable that in the redoubt excavations these appear to be most closely associated with the sod level. In the blockhouse area they were found in the refuse zone above the structural remains, but the sod level was included in some of the lots excavated there. It is possible that this is a significant chronological/stratigraphic distribution. None of the rectangular-sectioned specimens were associated with foundation trenches or structural elements.

The most common point form was a flattened point with a rounded outline. Straight-sided chisel-points are common on the larger spikes and the smaller nails tend to be sharp-pointed.

One small tack was found and three round-sectioned modern wire nails were recovered. One of these was from the sod level and two were from the refuse zone above the structural remains. These specimens were probably deposited during the period when this part of the island was used as a campground. Such specimens could have been easily intruded into the refuse zone from the overlying sod level.

Stone Specimens

A thin (9 mm) rectangular (50 mm by 56 mm) stone object has one right-angle corner and may be an artifact. It is grey and of very fine-grained soft materials which erode at the touch. Its entire surface is smooth.

An irregular glassy crystalline stone is 35 mm long and 15 mm thick.

A piece of slate 2.1 mm thick has a finished, beveled edge on one side. It may be a fragment of a school slate rather than a roof slate which would be thicker. A schoolhouse was located within the former redoubt area in 1870 (Lee 1966: 4, No. 56).

Wooden Artifacts

Several wooden objects were recovered.

One is a square-sectioned stake chopped at one end to form a point. It is most likely a tent stake from the campground activity in this area in recent years. It is 29 mm by 33 mm in section and 286 mm long.

Several short fragments of wood are round in section and bear cutting marks where one end has been tapered to a point. Other examples are fragments not clearly exhibiting the tapered end. The specimens could be construction pegs, but their identification is doubtful. They range from 56 mm to 120 mm in length and from 14 mm to 34 mm in diameter.

Rubber Artifacts

A fragment of rubber boot heel was recovered; it is an overshoe fragment, probably of modern origin.

Fragments of modern linoleum with a black and white rectangular pattern were also found. All are pieces of the same material. This is also most likely very recent campground debris.

Ceramics

A total of 3,509 potsherds were recovered in the redoubt and blockhouse excavations. The ceramic specimens include coarse earthenwares, stonewares, creamware, pearlware, refined white earthenware, ironstone and porcelain. Although pottery types representing the entire military occupation of Ile-aux-Noix were recovered, the bulk of the specimens are 19th-century types.

Since the area of the redoubt-blockhouse complex was later utilized for the navy yard facilities, it was hoped that stratigraphic excavation would permit the association of ceramic specimens with these two periods of occupation. As will be shown in the ceramics analysis, this rarely proved to be the case. Almost all of the specimens were recovered from the post-redoubt/blockhouse stratigraphic levels and very few specimens were associated with probable builders' trenches or structural features. The refuse layer, though of later deposition, appears to contain a mixture of specimens from both occupation periods of this area of Ile-aux-Noix. (*See* Table 10 for a stratigraphic tabulation of the ceramics found.)

Despite the fact that most specimens came from a mixed layer, some typological and chronological separation is possible. Ironstone and brown stoneware bottles, for example, not manufactured until 1813 and 1820, must represent ceramic types associated with period 3 at the site. Creamware and pearlware would be more typical of the period 2 time span but could be found in the later period as well.

Like other artifacts recovered during the excavations, none of the ceramics were found in functional contexts but rather were in a blanket of refuse above structural remains. As a result, the analysis of the ceramics cannot be expected to yield much significant data beyond that related to stratigraphic/chronological problems.

The identification of these ceramics was based on reference to such sources as Miller and Stone (1970), Noël Hume (1970), Webster (1971) and other sources cited specifically in the discussion below. These specimens were classified in conjunction with the analysis of materials recovered from other excavations by the author on

Ile-aux-Noix and reference to that report might be helpful (Grange 1974).

The ceramics have been described last so that their description will immediately precede the stratigraphic analysis which rests most heavily upon the ceramic data.

Coarse Earthenware

Unglazed Red Coarse Earthenware

A quantity of unglazed earthenware with a strong orange-coloured body was found. The fabric is soft and fine and lacks aplastic tempering inclusions. The vessels were thrown on a wheel and throwing rings, or striations, are visible on both the interior and exterior surfaces of some sherds.

The vessel forms include thickened, rounded rims and flattened rims with an encircling cordon below a groove underneath the rim on the exterior of the vessel. One base fragment is flat-bottomed with a straight, flaring vessel wall (Fig. 58a, b).

These specimens are very similar to unglazed, red-bodied earthenwares recovered at Castle Hill (Grange 1971: 305) where they were identified as French materials. If these specimens are correctly identified as French at Ile-aux-Noix, they must have been from a context disturbed by both the redoubt and the later naval yard. They tend to have come from greater depths below surface, only a few being associated with the sod level stratum. None are from an unmixed context and were all recovered from levels containing British ceramics of the 19th century.

It is possible that these few sherds could be interpreted as faint evidence that the French redoubt Saint Louis could have been located in this area subsequently chosen as the site of the northeastern British redoubt and later as the navy yard. The location on the map would fit this interpretation (Lee 1965: Maps 1 and 2; and see Fig. 1).

Excavations in search of this French feature were carried on in other locations of the island, but without success.

Unfortunately, no undisturbed archaeological context as a source for these sherds was found. If this interpretation of these sherds is correct, however, the hypothesis could be advanced that the French redoubt was in this area (Grange 1974: 74-5). On this basis it could be suggested that additional excavations within the right redoubt area might result in the location of some evidence of the French redoubt.

Brown/Olive-Glazed Coarse Earthware

One group of coarse earthenware specimens has a strong orange-coloured paste which is granular in texture and has sparse aplastic inclusions of medium size. The glaze is on the interior surface, the exteriors being unglazed, but smoothed. Striations on the surface indicate wheel-thrown manufacture. The glaze is light olive brown in colour, most examples being a light olive brown (Fig. 58c).

Vessel forms are indeterminate but a large, open bowl form is most likely. One sherd has a rounded rim and a narrow, flattened marly but is probably from an open bowl form.

These specimens may be of French or French-Canadian origin (Miller and Stone 1970: 56; Webster 1971: 9, 41-6). (*See* Table 10.)

Clear Lead-Glazed Earthenware

Additional examples of lead-glazed coarse earthenware are also specimens with a coarse red body. These have a clear lead glaze giving them a brown colour on the glazed side, the exterior is usually unglazed. This category also includes some split sherds and unglazed specimens which are probably unglazed parts of glazed vessels. They have been included in this type on the basis of their paste characteristics.

These specimens, although lacking slip decoration, are very similar to those decorated with trailed slip lines and are probably portions of such vessels.

The vessel forms include a flat-bottomed bowl base and straight flared sides and a second base with a flat bottom and a cordon heel. Rims are thickened and rounded. (Fig. 59a-c.) They are similar in form to the brown/olive coarse earthenware.

Brown/Olive-Glazed Coarse Earthenware

Another group of coarse earthenware sherds has been separated on the basis of their brown interior glaze. The fabric is strong orange in colour and of granular texture with sparse, fine aplastic inclusions. The vessel form is represented by basal sherds. These have a flat bottom and straight, flaring sides interpreted as the same general open bowl form of the other coarse earthenware categories (Fig. 59e-g).

One brim fragment has a concave interior profile and a convex exterior profile with a trace of an encircling cordon like a ring around the exterior of the rim.

One bodysherd fragment has a narrow groove incised on the unglazed exterior.

Dark-Brown-Glazed Coarse Earthenware

One split bodysherd fragment of a coarse earthenware with a strong orange paste has a speckled brown glaze (Fig. 58d).

Plain Slipware

A coarse earthenware with a strong yellowish brown fabric is decorated on the interior with a white slip which appears yellow beneath a clear glaze. The paste is medium fine and slightly granular. It lacks aplastic inclusions and is relatively hard.

The interior of the vessels has a thin layer of white slip. On some the exterior surface immediately below the rim is also partly covered with a much thinner trace of the white slip. The rim is left unslipped and appears a strong brown colour beneath the clear glaze. The exterior surfaces are smoothed but the body is usually unglazed, although some rims are glazed on the exterior.

The vessels appear to have been open bowls or milk pans with a straight outflared rim. The base fragment has a flat bottom and a straight outflared wall.

Most sherds are plain white slipped on the interior, but a few examples also have mottled brown and white slip beneath the clear glaze (see Fig. 60 and Table 10).

Fine Earthware

Delftware

Three delftware specimens have a buff-coloured, sandy paste and a bluish tinted tin glaze. All are bodysherds from vessels of probable bowl form. One specimen is plain and two bear traces of floral designs in blue and black colours. One of the latter is a sherd with a thinly tapered rim.

Green-Glazed Cream-Bodied Earthenware

This distinctive fine earthenware is made with cream-coloured paste and has a moderate yellow-green coloured glaze (5GY 5/6). This type of ware is a significant time-marker having been produced in 1759 (Noël Hume 1970: 124).

The three sherds of the type recovered are all body sherds and the vessel form represented cannot be determined (see Table 10).

Creamware

A quantity of creamware sherds were recovered in these excavations. These sherds have a cream-coloured body and appearance. A few examples have moulded decoration which includes rows of dots, but plain plate brims are most common. The vessels are flat-bottomed, some with an indented centre forming a single foot-stand ring while others have wedge-shaped foot rings. Scalloped plate brims are present as well as plain ones.

Creamware was being made about 1762 (Noël Hume 1970: 125) and is a significant time-marker at Ile-aux-Noix. Period 1, the short French occupation and initial British capture of the site, terminated in 1761. The presence of creamware in an undisturbed, stratigraphic context is, therefore, an excellent marker for period 2, though the type may also continue in use into period 3.

Undecorated Pearlware

Undecorated pearlware sherds, very numerous in the site, also represent a type of pottery expected in the period 2 occupation, although it would continue in popularity into period 3. Pearlware is distinguished by the presence of a bluish tinge to the glaze in pools in foot rings and other crevices (Noël Hume 1970: 130), both the undecorated pearlware and the decorated varieties having this trait. The glaze also has a rippled texture as described by Coysh (1970: 110).

The decorated specimens are described separately on the basis of their particular decorative pattern. It should be noted that the undecorated specimens were in all probability segments of vessels decorated on other parts. For example, the shell-edge pattern is confined to the brim edge and most of the bodysherds of a shell-edge decorated plate would fall into the undecorated category if they could not be fitted to a rim fragment.

Vessel forms represented by the undecorated pearlware specimens are probably plates. One brim and two indented foot-ring sherds are clearly plates. The remainder are indeterminate except for one basal fragment which may be part of a cup.

Blue and Green Shell-Edge Refined Earthenware

Pearlware plates decorated along the border of the edge with the shell-edge design were present in the collection. These include both specimens in which the pattern is moulded and then overpainted with the blue or green colour under the glaze, and some specimens in which the border is plain but painted to give it the simulated appearance of the moulded edge decoration.

The recognizable vessel form is the plate. Rims with both circular and wavy edge outlines are present. Some brims are flat, others concave (Fig. 61).

Most examples are blue; only 11 are green. Only five green and three blue shell-edge examples have the ripply glaze appearance and bluish colour of true pearlware. The remainder of this type of rim decoration are examples of refined white earthenware.

Blue Transfer Print, Willow Pattern, Pearlware

Sherds bearing the distinctive border design or elements of the pictorial scene termed the "Willow Pattern" (Noël Hume 1970: 130) were segregated in this category.

These specimens all appear to be fragments of plates.

Flat-bottomed sherds and one with a very slightly raised foot ring are present. The plate brims are flat to very slightly concave and the rims are both circular and scalloped in outline; they have rounded lips (see Fig. 62 and Table 10).

Moulded Embossed Refined White Earthenware

A few examples of moulded, embossed decorated refined earthenware were identified.

One of these is a plate brim with a poorly defined floral motif on the concave brim and a blue band around the rim and at the brim/body juncture. It is refined, white earthenware (Fig. 63c).

Two sherds of moulded, refined white earthenware are from an indeterminate vessel (not a plate). The moulded pattern may be floral (Fig. 63a).

Five sherds are moulded and green glazed, but too small for futher identification (Fig. 63b). These may be of pearlware rather than whiteware, but sherd size is too small for positive identification.

Blue-Banded White Earthenware

One rimsherd has a simple blue band painted around the edge of the plate rim. It resembles the blue shell-edged ware except that it has neither the moulded pattern nor a simulated painted pattern.

Refined White Earthenware

The most common type of pottery recovered from the redoubt-blockhouse excavations was refined white earthenware of the post-1820s. Although difficult to specifically identify, these wares are significant time-markers for these excavations, since they did not appear until after the redoubt-blockhouse occupation was terminated; they are markers of period 3 at the site. Many specimens lack the greenish or bluish tint characteristic of creamware or pearlware (Noël Hume 1970: 130-1) or other glaze characteristics of pearlware (Walker 1971: 125). However, some sherds do exhibit a bluish tint in the glaze, especially before 1860 (Sussman 1973: pers. com.), and on this basis plain white and bluish tinted sherds have been segregated.

A wide variety of vessel forms is implied by the sherds ranging from cups to bowls and chamber pots (see Figs. 64, 65). The chamber pot brim is flanged. Small bowl forms have outflared foot rings while a larger bowl has a thick foot ring. These are both rounded and wedge-shaped while plate foot rings are low and rounded or indented (see Fig. 64). Both strap and loop handles are present and one lid with a flange-like base was found.

Two examples are marked (see Fig. 65). One of these has an illegible, impressed mark on the bottom of a flat vessel base (Fig. 65a) while the other is a transfer-printed label on the wall of the container (Fig. 65b). The manufacturer has not been identified, but part of the word NEW-YORK implies an American origin.

See Table 10 for a listing of these specimens.

Transfer-Printed Refined Earthenware

A common form of decoration on refined white earthenware was transfer printing. Several colours are present in the collection, but blue was most common. The prints include floral border elements on plate brims (see Fig. 66) and scenic views (see Figs. 66d, 67). Vessel forms include plates, cups and a serving vessel (implied by a large handle fragment). A crabstock form handle was also present (Fig. 66g). Cups had slightly flared rims and a low foot ring (Fig. 67d, e). All of these forms are associated with transfer printing in a relatively dark blue colour. The only mark observed is an impressed anchor.

A second variety of blue transfer-printed ware is printed in very light blue tint. The vessel forms include a cup with a recurved profile; plates and jars are also included. The printed designs are both geometric and floral or scenic.

Transfer-printed refined earthenware also includes specimens in black, brown, purple, red and green colours. As in the other transfer-printed specimens, the designs are geometric, floral and scenic. The sherds are generally too small for identification beyond the note that plates and recurve-profile forms are included.

Sponge-Decorated Refined Earthenware

Refined white earthenware sherds decorated with mottled or sponge colours are also present. Most commonly the mottled colouring is blue. Twenty-seven sherds have both red and blue colours and four have blue and yellow colours combined. Where two colours are combined, a relatively straight line demarks the point of juncture between differently coloured panels or bands except on vessel bottoms where circular patterns are seen (see Fig. 68).

Vessel forms include tea bowls (?) with raised circular outflared foot rings. One of these specimens has a stamped design on the exterior centre of the bottom. The design is a circle of parallel rays surrounding a central dot. Other vessel forms base fragments have low rounded foot rings (plates ?) and vertical to slightly outflared rims. Vessels with recurved shoulders low on the vessel wall (similar to the banded ware form) are also present. One bodysherd is probably a teacup with the lower part of a handle intact; the vessel wall has a recurved profile (Fig. 68f).

Flow Blue Transfer-Printed Refined Earthenware

A number of the refined earthenware sherds are decorated with dark blue transfer-printed designs which have flowed beyond the printed design. This is a relatively late form of decoration (Collard 1967: 118, 123).

Vessel forms include plates with deeply concave brims and others with moulded panels in the brim. Flaring rims and vertical rims suggest bowl or cup vessel forms (see Fig. 69).

The blurred designs are floral, scenic or geometric.

One three-dimensional moulded floral object is the finial or knob from a vessel cover.

Underglaze Polychrome-Painted White Earthenware

A common variety of pearlware was painted in various colours under the glaze. The sherds are too small to reconstruct entire patterns but the designs are floral ones (see Fig. 69d-e and Table 10). The most common vessel form is the bowl. One base sherd has a rounded foot ring.

Ironstone

Only a small number of sherds have been identified as ironstone. Some of the specimens included in the refined white earthenware category may belong in the ironstone classification, but distinctions are difficult to make. The specimens identified as ironstone have been classified on the basis of maker's marks which are similar to specimens previously identified as ironstone (Grange 1973: 120-4) in other operations.

These specimens are plain white, but include a fair number with moulded panel decorations. The colour is white, the glaze is finely crazed and frequently stained black in the crazed lines (see Fig. 70).

Vessel forms include plates without moulded panels on the brims and low, rounded foot rings. Flat-bottomed plates are also present but low foot rings are most common. At least one bowl form is also present. One large base sherd has a foot ring of about 90 mm in diameter; the rounded foot ring is 8 mm high and flares outward.

Banded Yellow Ware

The banded yellow earthenware specimens have a pale orange-yellow paste and a clear glaze which results in a yellowish glaze colour. Some examples include bands of white slip on which are small, irregular mocha-like spots of blue color. Most sherds are plain yellow, however. Although most of the sherds are plain, the presence of a few examples of slip-decorated bands is taken as a basis for the classification of the entire group of specimens as banded yellow ware (Fig. 71b, c).

The vessel forms are indeterminate. One large vessel base 78 mm in diameter has a rounded foot ring. Four rim sherds resemble plate brims.

Annular Decorated Ware

The most common variety of annular decorated ware has a grey background and blue bands, but there are some white, brown and blue combinations. Some specimens have a painted mocha-like decoration (Fig. 71a, d, e). The identifiable vessel form is the bowl with a concave recurve about one third of the way up above the base.

Mocha Ware

Only a few sherds were identified as mocha ware characterized by the delicate fern-like design (Noël Hume 1970: 131). The largest example (Fig. 71f) has both grooved and trailed annular decoration.

Cyples Ware (?)

These specimens have a reddish fabric. One fragment with an earthenware paste has a strong orange colour. The remaining specimens are fired to a stoneware hardness. The glaze is dark brown to black and is present on both the interior and exterior surfaces. One rim sherd has a white slip band around the interior of the rim and two bodysherds have two parallel white slip-trailed lines.

The vessel forms are largely indeterminate although the curvature of the sherds suggests globular bodied vessels. One is slightly flared and has a rounded rim. Another sherd may be a fragment of a teapot spout. One fragment of a flat-bottomed base is also present. One strap handle also suggests a teapot form.

Unidentified, Burned Earthenware

A series of burned earthenware sherds could not be identified because of their charred and altered condition.

Stoneware

Brown Stoneware

Utilitarian stoneware sherds include specimens of various colours. A few are grey on the interior (the colour of the paste) while on the exterior they have strong yellowish brown (7.5YR 5/7) flecks. These specimens are salt-glazed. The vessel represented is probably a large jug. A larger group of specimens, probably from a single vessel, has a browner paste and both interior and exterior are strong yellowish brown (10YR 5/6) with a pebbly, salt-glazed surface texture. These sherds are probably from a large container with a flat bottom and a rounded shoulder. Incised grooves decorate the exterior shoulder. The interior exhibits deep wheel throw rings. The vessel had a mouth of about 130 mm diameter with a narrow (13 mm) collared rim formed by folding the exterior of the rim. The flat bottom of the vessel exhibits the dark slip, but here its firing has not produced the shiny glaze. One flat bottom sherd has a portion of a double lined oval impression or stamp. A third group of sherds has a greyish paste and a strong brown (2.5YR 4/7) slip on the exterior of the entire vessel and on the interior around the rim. Body sherds show a similar slip covering on the interior surfaces. The vessel form is indeterminate, but it included a rounded shoulder with incised, encircling lines. The vessel mouth is about 120 mm in diameter and the exterior of the rim is a rounded collar 22 mm high. Firing has produced a slightly pebbly textured and very shiny surface finish on both interior and exterior. A single sherd with a similar slip-glazed exterior has a plain, unglazed grey paste interior. Its form is indeterminate but a larger vessel is probable. Two sherds, including one with a large strap handle scar, have a strong, reddish brown exterior slip fired to a shiny glaze. A shoulder sherd has a single, incised encircling groove. The interior surface has a white slip with some reddish brown mottling. The white slip does not completely cover the interior surface; where present, it has fired to a shiny glaze. A large jug is inferred from the strap handle. Several thin sherds of grey paste have a strong brown (5YR 4/5) exterior slip or wash which incompletely covers the surface, the grey paste colour showing in patches. The ring-marked interiors show streaks of light brownish colour. The interior has a shiny salt-glaze appearance; the exterior has fired to a shiny brown glaze. Vessel form is indeterminate but a sloping shoulder sherd again suggests a probable jug form.

A few sherds of grey paste stoneware have a clear glazed exterior and are either unglazed or have a clear glaze on the interior. The exterior texture is rough (similar to salt glaze in appearance). One specimen is a rim which is everted and rounded.

White Salt-Glazed Stoneware

A single sherd of white salt-glazed stoneware was recovered from the site in this area. It is a rim sherd with a moulded decoration. The decoration is a floral design moulded in relief.

The vessel form is indeterminate but the sherd is that of a vertical-walled vessel with a slightly rounded, flattened lip.

Albany Slip Stoneware

Several sherds of stoneware with a brown-slip-glazed interior have been identified as Albany slip stoneware. The exteriors are grey.

The base sherd is flat-bottomed with a beveled heel. Throwing rings are present on the interior. The exterior bottom surface has parallel grooved lines apparently resulting from the removal of the vessel from the wheel.

A rounded shoulder sherd is present. Two rim forms are included. One is everted and flared with a flattened rim. The low neck rises above a sloping, rounded shoulder which has a single incised line around it. The second sherd also has a rounded shoulder with an incised groove but its neck rises vertically and terminates in a thick, flat rim. On the interior side of the rim is a groove and projecting shelf forming a ledge for an inset cover.

The interiors are glazed with a thick brown slip while the exteriors are grey with a pebbly, salt-glaze texture and occasional brown staining.

Brown Stoneware Bottles and Containers

Brown stoneware bottles of the 19th century were common in this part of the site and they are another important time-marker for period 3 occupations.

The paste is grey and the exterior is brown due to an iron oxide slip (Noël Hume 1970: 78-9).

The most common form is a cylindrical bottle with an angular shoulder, a short neck and a thick collared rim.

Larger flaring mouths are also frequent. Some base fragments were found. Elsewhere in the site a small, flared container form was more common, but it is present here as well. The base is indented; the bottom is of small diameter and the sides are straight but outslanted to a larger open mouth. There is a V-shaped groove around the exterior just below the rim, presumably for tying the closure.

Both bottles and containers are generally brown but vary in colour to lighter tans and white. One specimen has the stamped incuse word BOTTL---- just above the base.

These specimens were primarily blacking containers.

Clear-Glazed Stoneware

One handle fragment of a stoneware vessel with grey paste was found. It has a thick, clear glaze which is crazed. A portion of the thin-walled vessel with a rounded lip is present. The handle is massive and appears to be of the general crabstock form.

Porcelain

Chinese Porcelain (?), Polychrome

One rimsherd of Chinese porcelain (?) has an overglaze design painted around the interior of the rim. The pattern is one of criss-crossed, reddish purple lines between parallel orange lines. The lip is rounded and the sherd is very thin (1.8 mm thick). The ground is bluish white. The vessel form is probably a small bowl or cup.

Chinese Porcelain (?), Blue-Painted

Several thick porcelain sherds are very pale blue (2.5PB) with hand-painted designs in dark blue. One rim fragment has a portion of a floral design; the remainder have portions of blue streaks but the pattern is indeterminate. Two base fragments have wedge-shaped foot rings with unglazed edges. The bodysherds suggest a globular vessel form. One rim-like fragment is a flange-like form.

European Porcelain, Plain White

Most of the porcelain specimens are thin, plain white sherds of small bowls or deep saucer-like forms. They have rounded rims. Thicker specimens include one flat-bottomed sherd and base fragments with a low, rounded foot ring. Plate brim sherds are also present. One specimen has a flared foot ring, probably a bowl base fragment. Two fragments of cup handles were identified.

European Porcelain, Transfer-Printed
A few white porcelain sherds retain traces of blue transfer-printed decorations. One is a strap handle fragment while another is a base with an outflared foot ring of rectangular profile.

European Porcelain, Blue-Painted
One moulded porcelain specimen has a low, vertical rim 11 mm high and 60 mm in diameter. The low rim is plain while the globular body has vertically oriented rounded ridges and grooves. Around the shoulder is a single blue painted band.

European Porcelain, Overglaze Decorated
A few examples of white porcelain have traces of overglaze decoration.

One plate brim has remnants of parallel red lines around the rim.

One base sherd with a low, rounded foot ring has a trace of a purple line on the interior above the vessel bottom.

One sherd is a fragment of a handle with a purplish colour.

A flat base sherd has a floral design in red, green and gold on the interior and parts of three letters on the exterior in red overglaze painting. The word may have been OLD.

A concave plate or saucer brim has a deep blue and gold leaf pattern on the face.

Four sherds retain only the "ghost" impressions of formed floral overglaze decorations on the white porcelain. Traces of red paint are present on a tiny portion of one specimen.

Moulded Earthenware Figurines

Three fragments of moulded earthenware figurines were identified. One is apparently a portion of a garment fold but is too small for further description.

One specimen is part of a human figure, the torso portion, wearing a coat with buttons. There is a small spot of blue paint on the front.

The third specimen is the lower part of a human figure showing the legs and a skirt.

Ceramic Analysis

Historical evidence reviewed earlier indicates that both the redoubt and the blockhouse were intentionally demolished to make way for the navy yard facility on

Ile-aux-Noix. The archaeological evidence confirmed this expectation. Not only were no undisturbed floors or occupational deposits found, but there was evidence of the intentional removal of foundation stones and hearth platform rocks. The major refuse zone is a mixed layer associated with the post-redoubt/blockhouse occupation period.

In view of these facts, few of the artifacts recovered from the excavations could be directly associated with these two structures. Only the builder's trenches represented early features and they contained very few artifacts. In these circumstances, the ceramic remains offer little in the way of potential cultural data about the redoubt and blockhouse and are primarily useful as indicators of the dating of stratigraphic layers and other features. The ceramic analysis, therefore, focuses upon chronological interpretation.

One approach to ceramic analysis is to apply South's ceramic dating formula (South 1972) to the pottery specimens recovered from various stratigraphic units. South's method utilizes the mid-range or median date of the manufacturing span of ceramic types (South 1972: Fig. 1) and sherd counts to arrive at ceramic dates for a site or excavation unit. His median type dates are used in many cases in the following analysis. An effort to improve the dating results by estimating modal popularity dates for various ceramic types was made in preparation for ceramic analysis at Ile-aux-Noix (Grange 1973) and was utilized in a report on early fortification ditches at the site (Grange 1974). Those adjusted date estimates are used where appropriate in the formula calculations here. Additional type median date estimates, or modal date estimates, have been drawn from other sources as well. Nevertheless, a major difficulty with the formula date method remains the problem of determining the appropriate manufacturing period and mid-range or modal dates for various types to be used in the formula calculations. It can be shown, however, that dating results based on median type dates are very close to those based on modal type dates (Grange 1973), and if the dates are reported with standard deviations (Grange 1974), it is seen that they are statistically identical. Unless a very large proportion of sherds is involved, minor errors in the estimated median or modal type dates used in formula calculations do not result in significantly different dates. It should be noted at this point that the results obtained from South's ceramic dating formula are not absolute dates but mean date values which are essentially relative dates expressed in terms of calendar years. For this reason a legitimate question about formula dates may be raised since a mean date is not as useful to the archaeologist as are _terminus post quem_ or _terminus ante quem_ dates. It is not suggested that mean dates replace those limits, but that they offer an additional means of estimating chronological brackets. For this purpose the standard deviation seems particularly useful (Fitting 1972: 161; Grange 1974: 323). It is also possible to compare the calculated mean dates for a stratigraphic unit with expected mean dates derived from other evidence, a technique which has been of some use in the analysis of other excavation units at Ile-aux-Noix (Grange 1974). The method previously outlined is used in this analysis.

Type Date Values

Before proceeding to the formula date calculations, a brief review of the type date values used in this analysis is in order.

Unglazed red coarse earthenware, brown/olive-glazed coarse earthenware, clear-glazed coarse earthenware and brown-glazed coarse earthenware are all types closely similar to those described by Miller and Stone and dated to the 18th century (Miller and Stone 1970: 51; 56; 58) and thus a 1750 median date has been used for these types. Dark-brown-glazed coarse earthenware also resembles 18th-century pottery described by Miller and Stone (1970: Fig. 24). Although it lacks the fabric characteristics of Buckley ware (Grange 1974: 96), South's 1720-75 date range and 1748 median date (South 1972: Fig. 1) have been used in formula calculations.

Plain slipware is also an 18th-century type (Miller and Stone 1970: 59), but South's (1972: Fig. 1) date range of 1670-1795 and 1733 median date have been used here rather than 1750 which would be an acceptable alternative. South's 1750 median date for decorated delftware (1972: Fig. 1) has been employed as has the 1767 median date for the green-glazed cream-bodied earthenware.

Creamware of a 1762-1820 manufacturing span has a median date of 1791 (South 1972: Fig. 1), but a modal date estimate of 1770 (Grange 1973) is used for dating purposes here. Miller and Stone's 1765-80 range (1970: 44) would yield a median date of 1772 for this type although Walker (1971: 106) indicates continued manufacture through the 19th century and later.

South's date range for undecorated pearlware of 1780-1830 (1972: Fig. 1) indicates an 1805 mid-range date but this has been adjusted to a modal estimate of 1800 for this type (Grange 1973). In the case of the blue and green shell-edge wares, Walker (1971: 108-9) indicates the period of major popularity at 1790-1840 which would produce a modal estimate of 1815. This value has been used in this analysis.

South's 1818 median date (1972: Fig. 1) for willow pattern pearlware is replaced in these calculations by the 1825 modal date estimate (Grange 1973).

Moulded embossed pearlware has a date range of 1800-20 (South 1972: Fig. 1) but the moulded embossed sherds in this collection are not pearlware. Walker indicates that the form is not datable since it covers a span of 1740 to the present (Walker 1971: 110). For formula dating purposes, the 1820-1900 time span of whitewares has been used (South 1972: Fig. 1). Blue-banded earthenware has the same date range (Grange 1974: 110).

Refined white earthenware has been divided into two groups based on the presence of a slightly bluish tint in the glaze, a pre-1860 trait (Sussman: pers. com.). The blue-tinted sherds have thus been used with an 1840 median date factor, while the 1860 factor derived from the 1820-1900 manufacturing range (South 1972: Fig. 1) has been employed for the remainder of the refined white earthenware sherds.

Blue transfer-printed refined earthenware from these excavations appears to be on whiteware rather than pearlware and thus the 1820-1900 range is used here instead of the 1795-1840 period South employs (South 1972: Fig. 1). However, an estimated modal popularity date of 1830 is used here in formula calculations. It is based on Wakefield's assessment (1968: 1395). The same source suggests an 1840 modal estimate for lighter blue transfer-printed whiteware and for those specimens decorated with other coloured transfer prints. Collard (1967: 117-8) also indicates that the lighter colours are relatively later. The year 1829 is sometimes suggested for the beginning of red and brown transfer printing (Miller 1972: 193) although spans beginning in 1818 are also shown (Miller 1972: 194).

Sponge-decorated specimens are also present. An estimated span of 1840-70 and a mid-range date of 1855 has been used in these calculations (Grange 1974: 117) although Walker's 1800-60 span is an alternative possibility (Walker 1971: 134). Flowing blue transfer-printed specimens have an estimated 1850 median date on the basis of Collard's mid-19th-century evaluation (Collard 1967: 118, 123).

The median date for formula purposes for underglaze polychrome painted earthenware is 1830 while that for ironstone is 1857 (South 1972: Fig. 1).

Banded yellow ware is estimated at 1850 (Grange 1974: 126) as is the annular decorated sample. In the latter case, Walker's 1830-70 range (1971: 133) is used rather than South's 1790-1820 period (South 1972: Fig. 1).

South's 1843 mid-range date is used for mocha ware (South 1972: Fig. 1). An estimate of 1830 is used for the Cyples (?) material (Grange 1974: 129).

South's 1733 median date (1972: Fig. 1) for 18th-century brown stoneware is adjusted to a modal estimate of 1755 (Grange 1973). Similarly, South's 1753 median date of moulded white salt-glazed stoneware is adjusted to 1760.

Albany slip stoneware is given a 19th-century range (Osgood 1971: 59; Grange 1974: 136).

Nineteenth-century brown stoneware bottles were given an 1820-1900 span by South (1972: Fig. 1) which results in a median date of 1860 which has been employed in formula calculations. Noël Hume (1970: 79) indicates that the majority of brown stoneware bottles were made in the 1840-90 period and an estimated modal date of 1865 has been used in formula calculations on that basis.

Chinese porcelains were given a median date of 1730 by South (1972: Fig. 1), but modal estimates of 1750 (Grange 1973) and an 18th-century span (Miller and Stone 1970: 82) suggest a 1750 date may be better for formula purposes. European porcelains from the site appear to be 19th-century examples (Grange 1974: 149).

The date spans, median and modal date estimates for the types are listed in Table 9. The sherd counts used in formula date calculations have been listed in Table 10. Some undated and unidentified specimens are also listed in that table, but are omitted in date calculations.

Formula Dating

Specimens from all excavation lots within each major stratigraphic zone were combined for analysis. The mean ceramic formula dates for the blockhouse stratigraphy are presented in Table 11, and those for the redoubt sequence are to be found in Table 12. Particularly in the case of the redoubt, some further consolidation of refuse layer subdivisions is possible, and such combinations are shown in the final column of the table.

The formula dates may be compared with expected median dates derived from the known historical sequence of occupation. The blockhouse/redoubt construction period was 1782-83; a median date of 1782.5 for construction features such as builders' trenches would be expected. The occupation of these structures terminated in 1813 so that the expected median date for the occupation span would be 1794.5. Unfortunately, no undisturbed occupational levels were found in the excavations. Following the demolition of the redoubt, the area was heavily used as a navy yard facility and surrounded by various buildings of later date. The occupation of these structures terminated in 1864 (Lee 1966: 5, No. 60) and the military abandonment of the site came in 1870 (Lee 1965: 41). The refuse zones stratigraphically above structural remains of the redoubt and blockhouse must therefore date between 1814 and 1870. The expected median date for this period is 1842. This refuse could, of course, be expected to contain materials from the earlier occupation period as well, and its potential content range is therefore 1780-1870 with a median date of 1825. There is also a possibility that one of the early French redoubts was also sited here; some refuse from that period might also be included in various excavation units. The maximum occupational span for the site in these terms is 1759-1870 with a median date of 1814.5. These expected dates provide one means of assessing the mean ceramic formula dates since South has shown that such mean dates are close to expected median dates of other sites (South 1972). The historical models for the various stratigraphic units with their date brackets and expected median dates are recorded in Table 13.

The backfill layer in the blockhouse is not an occupational stratum and does not require further discussion.

The occupational refuse zone lies above the structural remnants and therefore is expected to reflect the 1814-70 period with an expected median date of 1842. Its formula date is 1837.8±31, a value quite consistent with expectations. If the more precise historical model based on destruction of the latest building is used, the expected span is 1814 to 1864 with a median date of 1839 (see Table 13). Rounding the formula date to 1838 brings the observed and expected values to only a year's difference. It has been suggested that the standard deviation of a mean ceramic date might be an indication of occupational brackets and in this case the 1807-69 range does compare favourably with the 1814-70 historical period.

Table 11 includes dates calculated for excavations inside and outside the limits of the stone foundation of the blockhouse. It is notable that the formula date for the refuse zone outside the foundation limits is more than ten years later than the mean date for the refuse zone above the foundation. There are no differences in the ceramic types present in these two areas, but there is a much greater frequency of refined white earthenware in the locations outside the foundation. This differential distribution does not appear to be significant to the interpretation of the blockhouse structure since that type post-dates the razing of the structure and the specimens are all found in the blanket of post-blockhouse refuse. The value of such formula date discrepancies is worth noting. Such a divergence demands at least a second look at the specimens and their context during the analysis before a final interpretation is reached. In this case, the divergent dates do not appear to reflect a culturally significant factor.

While formula dates for the post-blockhouse refuse are consistent with the expected results for that blanket of refuse, there are some discrepancies in other strata which warrant special comment.

Three drain features cut through the demolished blockhouse or lie stratigraphically above it. These features should belong to the 1814-70 period. They contained only four ceramic specimens, all early types producing a combined date of 1753.7±2, in contrast to the expected date of 1842. This discrepancy can be explained as the result of the mixing of early occupational specimens in the fill of these features which can only post-date the blockhouse by virtue of their stratigraphic position. Had these features been more extensively excavated, a larger sample of sherds might have been recovered, but that is speculative. The example illustrates that ceramic formula dates derived from small samples are inadequate. In any event, the interpretive problem and probable explanation would be the same even if the formula date method were not being employed.

The blockhouse builder's trenches pose similar problems for only four sherds were recovered from these features as well. Three specimens from a feature inside the foundation produce a date of 1776.7±46 where 1782.5 was the expected date. One sherd was a transfer-printed sherd (see Table 10) too late in type to be from the blockhouse construction period. It is possible that this sherd is an intrusive specimen resulting from disturbance during the subsequent occupation. An alternative explanation is that the trench may have been a demolition feature rather than a builder's trench. It is also possible that this feature was a continuation of one of the post-blockhouse drains. This possible interpretation of the feature should be kept in mind when using Table 11 data.

The builder's trench along the outside of the blockhouse foundation contained a single sherd of shell-edge ceramics and a mean formula date of 1815.0±0. The sherd must post-date 1780 and that is consistent with the construction period for this building.

Backfill materials in the redoubt do not represent an occupational stratum and need no further discussion.

The sod layer ceramics provide a formula date of 1839.8±29. With respect to the stratigraphic position of this level we could expect a date range of 1814-70 and an expected median of 1842.0, very close to the observed value. Had ceramic deposition been constant until 1966 (the area was used as a campground until recently) a median date of 1890 would be expected. The ceramic contents indicate little deposition after the 1870 abandonment of the site. Most of the modern specimens recovered from this layer were glass bottle fragments representative of the recent campground utilization.

The refuse layer beneath the sod represents deposition expected to reflect the 1814-70 post-redoubt period. This refuse was arbitrarily sub-divided during excavation into three levels. These include materials from above the level of the structural remains, materials from the refuse zone adjacent to structural remains, and specimens from refuse within rotted timber structural remains. All contained ceramics too late to be from the redoubt occupation period and the specimens most closely associated with the structural elements were most likely intruded during or after the demolition process. These refuse units produce a combined formula date of 1834.1$\pm$33 and a date range of 1801-67. These are consistent with the expected historical model although somewhat "earlier" than anticipated. The mixing of ceramic specimens from the redoubt occupation period and the subsequent occupation in the refuse blanket is the most likely explanation of these results.

One builder's trench was detected in the excavation of the redoubt. The feature contained only three sherds and these types postdated the demolition of the redoubt (see Table 10), as is also indicated by the 1850 formula date. As in the case of the blockhouse, such specimens are either intrusive ones or the feature may be reinterpreted as a demolition trench rather than a builder's trench. The excavations revealed evidence that the redoubt foundation had been robbed of stone in some places.

The ceramic specimens indicate that the post-moulds were post-redoubt features despite the fact that they were not detectable in the upper levels of the refuse layer. One sub-soil test excavated by Villeneuve produced ceramic specimens, indicating that the excavation must have included the bottom portion of the general refuse layer as well as undisturbed sub-soil.

A summary of the redoubt and blockhouse stratigraphy and a comparison of the formula dating results with the expected historical models is presented in Table 13. The layers are arranged in stratigraphic order and the blockhouse refuse layer is inserted in the sequence on the basis of the relative position of its formula date. The table also includes a column labeled "limit." This is the earliest date for the latest type found in the stratigraphic unit. The dates are based on ceramics, glass bottle and pipe fragments. The chronological date range of the unit must either postdate or at least include that limit within its occupational period.

It is notable that these limits are consistent with the historical models for levels identified as post-redoubt occupation as well as for the blockhouse builder's trench.

The ceramic analysis confirms the field identification of most stratigraphic units. The only exceptions are two supposed foundation builder's trenches which either contain intrusive ceramic sherds and other specimens, or must be interpreted as later demolition trenches or drains. The chronological periods estimated on the basis of ceramic contents closely parallel the expected date ranges. For example, based only on the ceramic limits, the blanket of refuse above the structural remains would be bracketed at 1820-49 which is consistent with the expected 1814-70 range for this stratigraphic level. If the 1820 limit is taken as the lower end of the bracket and the upper end determined by the upper end of the ceramic formula date standard deviation range, the archaeological model for the refuse zone would be 1820-69 which is even closer to the 1814-70 expectation.

In this case, given large ceramic samples, the mean ceramic formula date and its standard deviation range seems to provide an accurate estimate of occupation chronology, particularly if it is further refined by conventional ceramic bracketing estimates.

Conclusions

The purpose of these excavations was to examine the features thought to be remains of the right or northeast redoubt/blockhouse complex which was erected in the 1780s and replaced in 1813 to make way for the navy yard facility.

The blockhouse foundation was fully exposed during the two seasons' work, but the excavations in the redoubt were quite limited relative to the size of the structure. Two corners and one side of the pentagonal defensive work were traced and a cross-section of the structural remains was excavated. There is no doubt that the structural remains exposed have been correctly identified and correlated with the available historical plans of the site. Both the redoubt and blockhouse exhibit evidence of their purposeful demolition. The identifications are confirmed by the chronological analysis of the ceramics and other artifacts contained in a stratum of refuse overlying the structural remains.

The blockhouse foundation is that of a square building; this conforms with its depiction on historical plans. It had an outer foundation wall, an intermediate row of foundation piers and a central stone platform, probably a hearth and chimney foundation. The central platform had sockets in two opposed corners, suggesting a possible diagonal structural element. However, structural interpretation is limited by the fact that the upper courses of the foundation were deliberately reduced to a standard elevation during the demolition process, thus removing the most significant parts of the feature. Later drains cut through and over the foundation. It can be concluded that the blockhouse speculatively illustrated by Lee (1966: 3) is not a good model for interpretative reconstructions of this building at Ile-aux-Noix.

The foundation remnants of the redoubt consist of a series of parallel features which correspond closely to the sectional elevation of the rampart and casemate structure shown on one historical plan of the site (Fig. 27). It is concluded that this historical document, therefore, represents a solid basis for pictorial, scale or full-size interpretative reconstructions of the redoubt feature. The size of the redoubt relative to the area excavated is such that further extensive excavation would be necessary for a complete understanding of the fortification. Correlation of the feature with air photo crop marks has been successful but the excavations were insufficient in scope to fully explore the ditch and glacis area.

Ceramic formula dating as well as conventional bracketing estimates were used in the chronological analysis of the redoubt and blockhouse stratigraphy. These data confirm the field interpretation of the structures and strata with minor exceptions. Exceptions are features which either contain intrusive sherds or which must be reinterpreted as demolition trenches or late drains.

One objective of the 1966 field season was a search for French fortifications on Ile-aux-Noix. One area identified as potentially the site of the French redoubt Saint Louis is the site of the British redoubt. No structural evidence of the earlier French work was encountered during these excavations. However, a quantity of possible French or French-Canadian earthenware ceramics was found scattered in the refuse deposits. This suggests the possibility that French fortification elements might be found if the redoubt area is subjected to further excavation which would have to be broad in scale rather than limited to small test squares or cross-sectioning trenches.

Most of the artifacts recovered in these excavations came from the blanket of trash deposited over the structural remains of the redoubt and the blockhouse. No occupational zones associated with the redoubt or blockhouse were found and only a few specimens were recovered from such features as builders' foundation trenches. The specimens recovered were useful for chronological interpretation but provide little insight into the redoubt/blockhouse occupation period. Later structures such as the marine barracks have been excavated in this area and more meaningful artifact data concerning the 1814-70 period can be derived from those excavations. Only extensive exposure of the redoubt interior could be expected to result in the discovery of undisturbed redoubt occupational remains and a successful result of such exposure could not be confidently predicted on the basis of these exploratory excavations.

Appendix A.

Most of the front or redoubt No. 2 (see Fig. 2) was cut by the moat or buried beneath the ramparts of Fort Lennox. A small section of that redoubt was exposed in a narrow trench excavated during the 1966 field season in search of French fortification remnants. That excavation has been described elsewhere (Grange 1974: 63-8) but some comparative analysis is of value here. One reason is that the ground plan of redoubt No. 2 is available for study whereas no comparable illustration of the right redoubt is available. However, it is possible to compare the archaeological remains of the right redoubt with the profile and plan of redoubt No. 2 and thereby gain some additional insight into the possible arrangement of structures in the right redoubt. Thus, if the archaeological evidence of the right redoubt corresponds to the documentary illustration of redoubt No. 2, it may be possible to use the illustration of the latter fortification as a guide to interpretation or future excavations of the right redoubt.

The excavation of redoubt No. 2 exposed a stone and mortar wall which lay stratigraphically beneath a mass of rotted wood (see Fig. 72). The stone wall was 2.5 ft. wide (see Fig. 73). It paralleled the interior side of a deep ditch (Grange 1974: 63-8) and appears to be the foundation for the scarp of redoubt No. 2. It is notable that here there was no complex of two closely spaced walls and associated internal drain as in the casemate section of the right redoubt. The 1790 plan shows a section (see Fig. 27) of a redoubt without the casemates and there is but a single foundation beneath the scarp revetment. From this we may conclude that redoubt No. 2 did not have a casemate on the south flank of its west salient where it was tested by excavation. This can be confirmed by reference to the 1814 plan (see Figs. 2 and 74) which shows this structure's plan in detail and does not indicate any barracks or structure along that side.

It is notable on the 1814 plan of redoubt No. 2 (Fig. 74) that along its south flank the plan shows a narrow terreplein behind the parapet. In contrast, on the northern side of the west salient, the plan shows two additional features. First is the same narrow terreplein behind the parapet, then a short section of terreplein about twice as wide as the narrow section, and finally there is a long, rectangular structure jutting out into the redoubt interior. The latter structure is numbered "4" on the plan and identified as the commissariat store.

If the narrowest terreplein on the 1814 plan view is interpreted as a section of the redoubt lacking casemates, the intermediate width shown behind the parapet may be a plan view indication of the casemate structure. The casemates are not identified on the 1814 plan. The wider structure lines on the 1814 plan may be interpreted either as free-standing structures or as casemate extensions. The 1790 plan does not show such an arrangement but the 1814 plan is more detailed.

The section exposed on the salient of redoubt No. 2 appears to cut across a section where there was a rampart but no casemates, whereas the section exposed in the right redoubt reveals casemate foundations. The combined study of the tests of the two redoubts and the features shown in plan and section on the 1790 and 1814 plans thus combine to provide a better understanding of the redoubt structure.

Assuming that redoubts No. 1 and No. 2 shown on the 1814 plan were similar to the right redoubt, the profile inferred from the 1814 plan (see Fig. 74) can be used as an additional correlation of archaeological features of the right redoubt and historical evidence. An attempted correlation is shown in Fig. 75.

At the top of Fig. 75 a plan of redoubt No. 2 is shown. A numbered broken line descends from each line on the plan to an exaggerated profile section of the redoubt. Those points are then projected down to meet the inferred points on the archaeological plan of the right redoubt with which they might correlate. The lines on the archaeological section of Fig. 75 are lettered to correspond to the previous discussion of the foundation features (see Figs. 4, 24).

The outer line on the historical plan of the redoubt (line 1) is the outside perimeter of the glacis. The next line (2) must be the crest of the glacis slope and the adjacent line (3) the counterscarp. The broad, intervening space between lines (3 and 4) must be the ditch while the next line (4) can be interpreted as the foot of the scarp. The succeeding points (lines 5 and 6) are interpreted as the parapet. It is notable that embrasures are shown between these lines on the plan. The space between the next lines (6 and 7) must be the terreplein surface and has also been interpreted in the discussion above as representing the casemate roof. The next feature delimited (line 8) is either the exterior of the casemate and/or the ramp structure and/or the first barracks wall. The final line (9) is that of the other side of the barracks as shown on the plan. A single line (10) projects one side of the blockhouse location.

It is notable that most of these projections of the plan of redoubt No. 2 and its inferred profile correspond well with the sequence of redoubt features based on the previous correlation of the archaeological evidence and the 1790 section drawing.

Although the correspondence between the as-found structural remains and the 1814 redoubt plan is based on some assumptions and inferences, it generally supports the idea that the 1814 plan can probably be used as a reasonable, accurate depiction of the general nature of the redoubt, just as the 1790 section drawing may be so used.

Although the 1809 plan (Fig. 1) shows the redoubt, it does not bear the detailed descriptive data included on the 1814 plan. The 1809 plan probably depicts the line of the redoubt correctly, however, and thus forms another valuable document which may be used in the process of reconstructing the appearance of the redoubt.

The limited nature of the excavations relative to the size of the redoubt has already been discussed. Only additional excavation will permit the complete identification of redoubt features and their correlation with the plans of 1790, 1809 and 1814.

References Cited

Ashworth, Michael J.
1967
"Fort Lennox, Ile-aux-Noix Preliminary Report, 1965." Manuscript on file, National Historic Parks and Sites Branch, Parks Canada, Ottawa.
1967
Fort Lennox - Final Report, 1965 Season. Manuscript Report Series No. 34. Parks Canada, Ottawa.

Barka, Norman F.
1970
"Excavations at Ile-aux-Noix (5G), P.Q. -1964 Season." Manuscript on file, National Historic Parks and Sites Branch, Parks Canada, Ottawa. (Now available, as "The Archaeology of Fort Lennox, Ile-aux-Noix, Quebec, 1964 Season," in *History and Archaeology/Histoire et archéologie* No. 20 [1978].)

Canada. Public Archives. Map Division.
H4/350 Noix (Ile aux) 1789, plan c.
H4/350 Ile-aux-Noix-1790.
H4/350 Noix (Ile-aux)-1809.
H4/350 Ile-aux-Noix-1814.

Collard, Elizabeth
1967
Nineteenth-century Pottery and Porcelain in Canada. McGill University Press, Montreal.

Coysh, Arthur Wilfred
1970
Blue and White Transfer Ware, 1780-1840. David & Charles: Newton Abbot, Devon.

Fitting, James E.
1972
"Evolution, Statistics and Historic Ceramics." *The Conference on Historic Site Archaeology Papers 1971*, Vol. 6, Part 2, Section 1, pp. 158-163. Columbia, South Carolina.

Grange, Roger T., Jr.
1967
"Preliminary Report: Excavations at Ile-aux-Noix, Quebec, 1966." Manuscript on file, National Historic Parks and Sites Branch, Parks Canada, Ottawa.
1971
Excavations at Castle Hill. Manuscript Report No. 46. Parks Canada, Ottawa. 7 vols.
1973
"A Framework for Ceramic Analysis at Fort Lennox: Cumulative Seriation and Ceramic Formula Dating." Manuscript on file, National Historic Parks and Sites Branch, Parks Canada, Ottawa. (Now available, as "Cumulative Seriation and Ceramic Formula Dating: A Preliminary Study," in History and Archaeology/Histoire et archéologie No. 16 [1977].)

1974
"Early Fortification Ditches at Ile-aux-Noix, Quebec." Manuscript on file, National Historic Parks and Sites Branch, Parks Canada, Ottawa. (Now available in History and Archaeology/Histoire et archéologie No. 18 [1977].)

Hooper, Thomas
1967
"The Royal Navy Station at Ile-aux-Noix (1812-1839)." Manuscript on file, National Historic Parks and Sites Branch, Parks Canada, Ottawa.

Jones, Olive
1967
"Report on Glass Wine Bottles Found in 5G35J, the Old English Fort, Fort Lennox, P.Q." Manuscript on file, National Historic Parks and Sites Branch, Parks Canada, Ottawa.
1971
"Glass Bottle Push-ups and Pontil Marks." Historical Archaeology 1971, Vol. 5, pp. 62-73. Lansing, Michigan.

Lambart, H.
1963
"Appendices Which Accompany Report on Fort Lennox and Ile-aux-Noix." Manuscript on file, National Historic Parks and Sites Branch, Parks Canada, Ottawa.

Lee, David
1965
Ile-aux-Noix: 1759-1870. Manuscript Report Series No. 40. Parks Canada, Ottawa.

1966
Archaeological Prospectus For the Buildings Outside Fort Lennox, Ile-aux-Noix, Quebec, (Revised). Manuscript Report Series No. 41. Parks Canada, Ottawa.

McKearin, George Skinner, and Helen McKearin
1965
American Glass. Reprint of 1941 ed. Crown Publishers, New York.

Miller, George L.
1972
"The Application of the South Mean Ceramic Date Formula to a Nineteenth Century Site." *The Conference on Historic Site Archaeology Papers 1971*, Vol. 6, Part 2, Section 1, pp. 193-4. Columbia, South Carolina.

Miller, J. Jefferson II, and Lyle M. Stone
1970
Eighteenth-Century Ceramics From Fort Michilimackinac; A Study in Historical Archaeology. Smithsonian Institution Press, City of Washington. Smithsonian Studies in History and Technology, No. 4.

Noël Hume, Ivor
1961
"The Glass Wine Bottle in Colonial Virginia." *The Journal of Glass Studies*, Vol. 3, pp. 90-117. Corning, New York.
1969
Historical Archaeology. Alfred A. Knopf, New York.
1970
A Guide to Artifacts of Colonial America. Alfred A. Knopf, New York.

Olson, Stanley J.
1965
"Liquor Bottles From Florida Military Sites." *American Antiquity*, Vol. 31, No. 1 (July), pp. 105-7. Salt Lake City.

Osgood, Cornelius
1971
The Jug and Related Stoneware of Bennington. Charles E. Tuttle Company, Rutland, Vermont.

Oswald, Adrian
1955
"The Evolution and Chronology of English Clay Tobacco Pipes." *The Archaeological News Letter*, Vol. 5, No. 12. London.
1960
"The Archaeology and Economic History of English Clay

Tobacco Pipes." *Journal of Archaeological Association*, 3rd Series, Vol. 23, pp. 40-102.

Rick, John H.
1970
"Archaeological Investigations of the National Historic Sites Service, 1962-1966." *Canadian Historic Sites: Occasional Papers in Archaeology and History*, No. 1 (1970), pp. 10-44. Ottawa.

South, Stanley
1964
"Analysis of the Buttons from Brunswick Town and Fort Fisher." *The Florida Anthropologist*, Vol. 17, No. 2 (June), pp. 113-33. Gainsville, Florida.
1972
"Evolution and Horizon as Revealed in Ceramic Analysis in Historical Archaeology." *The Conference on Historic Site Archaeology Papers 1971*, Vol. 6, Part 2, Section 1, pp. 71-116. Columbia, South Carolina.

Swannack, Jervis D., ed.
1973
"National Historic Sites Service Archaeological Excavation Manual." Manual on file, National Historic Parks and Sites Branch, Parks Canada, Ottawa.

Toulouse, Julian
1969
"A Primer on Mold Seams, Part I, II." *Western Collector*, Vol. 7, No. 22 (Nov.), pp. 526-35; No. 12 (Dec.), pp. 578-87. San Francisco.

Wakefield, Hugh
1968
"Pottery, Porcelain and Glass," in *The Connoisseur's Complete Period Guides to the Houses, Decoration, Furnishing and Chattels of the Classic Periods*, eds. Ralph Edwards and L.G.C. Ramsey, Bonanza Books, New York.

Walker, Iain C.
1968
"Statistical Methods for Dating Clay Pipe Fragments." *Post-Medieval Archaeology*, Vol. 1, pp. 90-101. London.
1971a
"Nineteenth-Century Clay Tobacco Pipes in Canada." *Ontario Archaeology*, No. 16, pp. 19-35. Toronto.
1971b
Clay Tobacco Pipes from Nootka. Manuscript Report No. 59. Parks Canada, Ottawa.

Walker, John W.
1971
Excavation of the Arkansas Post Branch of the Bank of the State of Arkansas. Arkansas Post National Memorial, Arkansas. Southeast Archaeological Center, Division of Archaeology, Office of Archaeology and Historic Preservation.

Webster, Donald B.
1971
Early Canadian Pottery. New York Graphic Society Limited, Greenwich, Connecticut.

TABLES

Table 1. Major Occupation Periods, Ile-aux-Noix

Period	Chronology	Events
1	1759-61	French construction, defeat and British abandonment.
2	1761-75	Abandoned.
	1775-76	American occupation.
	1776-1809	First British fort and redoubts.
3	1809-12	Abandoned.
	1812-34	Naval shipyard.
	1819-70	Fort Lennox.
4	1870-Present	Post-military modern period.

Table 2. Blockhouse Stratigraphic Sequence

Turf
1965 backfill
Occupational refuse zone
Drain or ditch (?)
Linear refuse: drain fill above foundation
Drain which cuts through foundation
Foundation stones
Foundation builder's trenches
Sandy clay sub-soil

Table 3. Redoubt Stratigraphic Sequence

Backfill
Sod layer
Refuse layer to top of structural remains
Ditch fill layer (?)
Refuse layer adjacent to structural remains
Lots from within a structural element
Builders' trench
Post moulds
Sub-soil tests

Table 4. Bottle Finish and Neck Dimensions (mm)

Type	Neck Height	Neck Diameter Base	Neck Diameter Mid-Neck	Neck Diameter At String Rim	Lip Height	String Rim Height	Finish Diameter	String Rim Diameter	Interior Lip Diameter
1	87.0	41.0	38.0	35.0	6.0	4.0	37.0	35.0	18.5
2	75.0	38.5	35.0	30.0	11.0	4.0	39.0	35.0	21.5
3	–	–	41.0	32.0	12.0	7.0	34.0	35.0	18.5
4	89.0	37.0	33.5	26.0	11.5	9.0	32.5	29.0	17.0
5	87.5	38.0	38.0	28.0	10.0	7.0	33.5	31.0	19.0
5	76.0	37.0	37.0	29.0	13.0	7.0	34.0	31.0	19.0
5	84.0	34.0	31.5	26.0	12.0	6.0	30.0	28.5	20.0
5	–	–	–	26.0	11.0	7.5	32.0	30.0	18.0
6	80.0	38.0	40.0	29.0	12.5	7.0	34.0	33.0	20.0
6	87.0	36.5	38.0	36.0	12.0	5.0	30.0	28.0	19.5
6	–	–	36.0	27.5	14.0	7.0	31.0	29.5	21.0
6	–	–	36.0	30.0	12.5	8.5	33.0	32.5	19.0
6	–	–	–	30.0	11.0	8.5	33.0	32.0	20.0
6	–	–	–	–	12.0	8.5	33.0	30.5	–
6	–	–	–	–	15.0	5.0	–	–	–
6	–	–	–	–	11.0	6.0	29.0	–	18.0
6	–	–	–	–	13.5	5.5	–	–	–
7	–	–	40.0	31.0	–	–	–	–	–
8	–	–	–	–	20.0	5.0	–	–	20.0
8	–	–	–	–	–	–	–	–	–
9	–	–	–	–	15.0	5.0	30.0	34.0	20.5
10	95.0	–	38.0	26.0	18.0	7.0	28.7	29.1	20.0
11	–	–	–	25.5	5.0	9.0	27.0	30.0	18.0
12	–	–	–	–	–	10.5	29.5	32.0	19.0
13	100.0	40.0	32.0	26.0	9.0	5.0	29.0	30.0	18.0
14	–	–	–	31.0	–	–	–	–	–

Table 5. Bottle Base Dimensions (mm)

Type Number	Exterior Base Diameter	Push-Up Height	Resting Surface to Pontil Mark Height	Pontil Diameter	Vessel Body Diameter
1	–	–	–	–	–
2	75.0	45.0	36.5	29.0	74.5
3	80.0*	29.0	26.0	40.0*	–
4	83.5	43.5	26.0	41.5	80.5
4	85.5	28.0	23.0	32.0	84.0
4	88.5	38.0	29.0	46.0	83.0
4	89.0	32.0	18.0	48.5	85.0
4	84.0	28.0	13.0	44.0	80.5
4	86.0	40.0	15.0	48.0	84.0
4	96.0	31.0	15.0	59.0	88.0
4	92.0	45.0	17.0	34.0	88.0
4	114.0	36.0	24.0	57.0	98.0
5	86.0	38.5	16.5	52.0	85.0
5	95.0	50.0	18.0	59.0	–
5	–	35.0	18.0	42.5	–
5	–	43.0	15.0	53.0	–
5	78.0	34.0	15.0	41.0	77.0
5	94.0	45.0	17.0	64.0	–
5	88.0	30.0	12.0	47.0	–
6	80.0	41.0	–	–	–
6	–	30.0	–	–	–
7	90.0	32.0	12.0	–	–
7	78.0	32.0	13.0	50.0	80.0
7	94.0*	33.0	18.0	46.0	–
7?	–	–	–	–	–
8	77.0	25.0	9.0	49.0	83.0
8	80.0	26.0	9.0	47.0	82.0
8	–	–	–	–	–
9	90.0*	–	–	–	–
10	86.0	9.0	–	–	86.0

* Estimated

Table 6. Stratigraphic Distribution of Bottle Finishes and Bases

Stratigraphic Unit	Finish Type														Base Type									
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10
Backfill	1																							
Redoubt sod level			1			3		1	1	1		1				1				1	1	1		1
Blockhouse refuse and occupation above foundation					1	3		1										3	1					
Redoubt refuse and occupation above foundation						1	1				1						1	2	1		1		1	
Redoubt adjacent to foundation						1													1	1				
Redoubt within wall																			1					
Redoubt builders' trench				1	3									1				1	2		1	2		
Redoubt sub-soil test			1										1		1			2	1					

Table 7. Marked Stem Fragments

Specimen	Description	Specimens by Bore Diameter 4/64 in.	 5/64 in.	 6/64 in.
1	Moulded floral design at end of stem near bowl scar; part of a decorated bowl (?)	1		
2	Impressed mark, A COGHI.. ...SGOW		1	
3	Impressed mark, A COGH... ...SGOW	1		
4	Impressed mark, A COGHILL 23 mm long GLASGOW 25 mm long	1		
5	Impressed mark, ...DERSON MON.....		1	
6	Impressed mark, ----LL GLA....	1		
7	Impressed mark, McDOUGALL, GLASGOW	1		
8	Impressed mark, ----GA---- GLA....	1		
9	Impressed mark, W & D BELL QUEBEC			1
10	Impressed mark, ...NNERMAN MONTR...		1	
11	Impressed mark, ----D		1	
12	Impressed mark, MCDOUGALL GLASGOW		1	
13	Impressed mark, McDOUGALL GLASGOW			

Table 8. Stratigraphic Distribution of Datable Pipe Fragments

Stratigraphic Unit	Pipes Present and Dating	Bracket	Earliest Date of Latest Specimen
Redoubt sod level	Coghill 1826-1904 McDougall 1846-1891 W & D Bell 1862-1877 Bannerman 1858-1907	1826-1907	1862
Blockhouse refuse zone above foundation	Coghill 1826-1904 Henderson 1847-1876 Type 12 1820-1870 WW [1745-1845] TD Impressed Fluted 1780-1820 Masonic 1800-1830 TD Moulded	1780-1904	1847
Redoubt refuse zone above foundation	McDougall 1846-1891 Coghill 1826-1904 Fluted 1780-1820 TD Moulded	1780-1904	1846
Redoubt refuse zone adjacent to foundation	Coghill 1826-1904 McDougall 1846-1891	1826-1904	1846
Blockhouse builder's trench	TD in wreath	19th century	
Redoubt builder's trench		19th century	
Redoubt sub-soil test		19th century	

Table 9. Ceramic Type Date Estimates

Type	Date Range	Median	Modal
Unglazed red coarse earthenware	1700-1800	1750	
Brown/olive-glazed coarse earthenware	1700-1800	1750	
Clear-lead-glazed coarse earthenware	1700-1800	1750	
Brown-glazed coarse earthenware	1700-1800	1750	
Dark-brown-glazed coarse earthenware	1720-1775	1748	
Plain slipware	1670-1795	1733	
Delftware	1600-1802	1750	
Green-glazed cream-bodied earthenware	1759-1775	1767	
Creamware	1762-1820	1791	1770
Undecorated pearlware	1780-1830	1805	1800
Blue & green shell-edged refined earthenware	1780-1830	1805	1815
Willow pattern pearlware	1795-1840	1818	1825
Moulded embossed refined white earthenware	1800-1860	1810	1830
Blue-banded white earthenware	1820-1900	1860	
Refined white earthenware, blue tint	1820-1860	1840	

Table 9. Continued

Type	Date Range	Median	Modal
Refined white earthenware	1820-1900	1860	
Transfer-printed refined earthenware blue	1820-1900	1860	1830
Transfer-printed refined earthenware, light blue	1820-1860		1840
Transfer-printed refined earthenware, miscellaneous & various colours	1818-1864		1840
Sponge-decorated refined earthenware	1840-1870	1855	
Flow-blue transfer-printed refined earthenware	1840-1860	1850	
Underglaze polychrome-painted white earthenware	1820-1840	1830	
Ironstone	1813-1900	1857	
Banded yellow ware	1849-1858	1858	
Annular decorated ware	1790-1870		1850
Mocha ware	1795-1890	1843	
Cyples ware (?)	1820-1840	1830	
Burned earthenware (unidentified)	--		
Brown stoneware	1690-1775	1733	1755
White salt-glazed stoneware	1740-1765	1753	1760

Table 9. Continued

Type	Date Range	Median	Modal
Albany slip stoneware	1800-1900	1850	
Brown stoneware bottles/containers	1820-1900	1860	1865
Clear-glazed stoneware	--		
Chinese porcelain	1660-1800	1730	1750
European porcelain	1800-1900	1850	
Moulded earthenware figurines	--		

Table 10. Stratigraphic Tabulation of Ceramics

	Blockhouse Stratigraphic Units				
Ceramic Types	Backfill	Refuse Layer Over Structures	Drain over Structures	Builder's Trench	Builder's Demolition(?)
Unglazed red coarse earthenware					
Brown/olive-glazed coarse earthenware		8	1		2
Clear-lead-glazed coarse earthenware	2	16			
Brown-glazed coarse earthenware					
Dark-brown-glazed coarse earthenware	1				
Plain slipware	1	16			
Delftware	3				
Green-glazed cream-bodied earthenware		3			
Creamware		18			

Table 10. Continued

	Blockhouse Stratigraphic Units				
Ceramic Types	Backfill	Refuse Layer Over Structures	Drain over Structures	Builder's Trench	Builder's Demolition(?)
Undecorated pearlware		13			
Blue & green shell-edged refined earthenware	2	36		1	
Willow pattern pearlware	4	25			
Moulded embossed refined white earthenware		3			
Blue-banded white earthenware					
Refined white earthenware, blue tint	3	131			
Refined white earthenware	30	407			
Transfer-printed refined earthenware, blue	29	123			1

Table 10. Continued

	Blockhouse Stratigraphic Units				
Ceramic Types	Backfill	Refuse Layer Over Structures	Drain over Structures	Builder's Trench	Builder's Demolition(?)
Transfer-printed refined earthenware, light blue					
Transfer-printed refined earthenware, miscellaneous colours	1	24			
Sponge-decorated refined earthenware	2	85			
Flow-blue transfer-printed refined earthenware	2	27			
Underglaze polychrome-painted white earthenware	4	32			
Ironstone	7	6			
Banded yellow ware		15			
Annular decorated ware	3	44			

Table 10. Continued

	Blockhouse Stratigraphic Units				
Ceramic Types	Backfill	Refuse Layer Over Structures	Drain over Structures	Builder's Trench	Builder's Demolition(?)
Mocha ware		5			
Cyples ware (?)					
Burned earthenware (unidentified)	6	1			
Brown stoneware	2	95	3		
White salt-glazed stoneware					
Albany Slip stoneware					
Brown stoneware bottles and containers					
Clear-glazed stoneware					
Chinese porcelain		4			
European porcelain		11			
Moulded earthenware figurines		1			

Table 10. Continued

Ceramic Types	Redoubt Stratigraphic Units Backfill	Sod Layer	Sod and Refuse Mixed	Refuse Layer Over Structures	Refuse Layer Adjacent to Structure	Refuse Within Structure Element	Builder's Trench	Post Moulds	Sub-Soil Test
Unglazed red coarse earthenware		1	15	30					
Brown/olive-glazed coarse earthenware		4	3	8					
Clear-lead-glazed coarse earthenware		4	1	10					
Brown-glazed coarse earthenware		2		6	1				
Dark-brown-glazed coarse earthenware									
Plain slipware				2					
Delftware									
Green-glazed cream-bodied earthenware									
Creamware		8		35	4				

Table 10. Continued

	Redoubt Stratigraphic Units								
	Backfill	Sod Layer	Sod and Refuse Mixed	Refuse Layer Over Structures	Refuse Layer Adjacent to Structure	Refuse Within Structure Element	Builder's Trench	Post Moulds	Sub-Soil Test
Undecorated pearlware			1	1	1				
Blue & green shell-edged refined earthenware		4	2	27	3	2			
Willow pattern pearlware		5		8					
Moulded embossed refined white earthenware		1	3	1	1				
Blue-banded white earthenware		1							
Refined white earthenware, blue tint		23	17	34	2				1
Refined white earthenware	2	192	89	375	18		2		4
Transfer-printed refined earthenware, blue	1	165	26	155	55		1		4

Table 10. Continued

	Redoubt Stratigraphic Units								
	Backfill	Sod Layer	Sod and Refuse Mixed	Refuse Layer Over Structures	Refuse Layer Adjacent to Structure	Refuse Within Structure Element	Builder's Trench	Post Moulds	Sub-Soil Test
Transfer-printed refined earthenware, light blue		35	24	37	9				4
Transfer-printed refined earthenware, miscellaneous colours		14	3	15					
Sponge-decorated refined earthenware		40	9	18	2				
Flow blue transfer-printed refined earthenware		22	3	12	2			1	
Underglaze polychrome-painted white earthenware		27	3	42	2				
Ironstone		70	1	36					
Banded yellow ware		24	9	32	1				
Annular decorated ware		24	8	27	2	1			

Table 10. Continued

	Redoubt Stratigraphic Units								
	Backfill	Sod Layer	Sod and Refuse Mixed	Refuse Layer Over Structures	Refuse Layer Adjacent to Structure	Refuse Within Structure Element	Builder's Trench	Post Moulds	Sub-Soil Test
Mocha ware		2							
Cyples ware (?)		3	2	23	2				
Burned earthenware (unidentified)		21	19	50	2				
Brown stoneware		35	18	35	3				
White salt-glazed stoneware				1					
Albany Slip stoneware		15		7					
Brown stoneware bottles and containers		24		24					
Clear-glazed stoneware		1							
Chinese porcelain		2	1	5					
European porcelain		14	10	9					
Moulded earthenware figurines		1		1					

Table 11. Ceramic Formula Dating of Blockhouse Stratigraphy

Stratigraphic Units	Inside Foundation		Outside Foundation	Foundation Corners	Combined Layer Units
Turf	-		-	-	-
Backfill		1835.2±31 1804-1866			1835.2±31 1804-1866
Occupational refuse zone	1831.7±35 1797-1867		1842.9±26 1817-1869	1839.8±31 1809-1871	1837.8±31 1807-1869
Drain or ditch	-		-	-	
Linear refuse drain fill above foundation			1750.0±0 1750		1753.7±2 1752-1756
Drain which cuts through foundation			1755.0±1 1754-1756		
Foundation stones	-		-	-	-
Foundation builder's trench	1776.7±46 1731-1823		1815±0 1815		1786.2±42* 1744-1828
Sub-soil	-		-	-	-

* A probably invalid combination based on reinterpretation of "builder's trench" inside foundations; see text.

Table 12. Ceramic Formula Dating of Redoubt Stratigraphy

Stratigraphic Units	Formula Dates (Strata)	Combined Units Formula Dates
Backfill	1851.4±7 1844-1858	1851.4±7 1844-1858
Sod layer	1839.8±29 1811-1869	1839±29 1811-1869
Refuse layer to top of structural remains	1834.5±34 1800-1868	
Ditch fill layer (?)	-	
Refuse layer adjacent to structural remains	1831.1±23 1808-1854	1834.1±33 1801-1867
Refuse layer in structural element	1850.0±0 -1850-	
Builders' trench or demolition trench	1850.0±0 -1850-	1850.0±0 -1850-
Post moulds	1853.3±3 1850-1856	1853.3±3 1850-1856
Sub-soil test	1843.1±12 1831-1855	1843.1±12 1831-1855

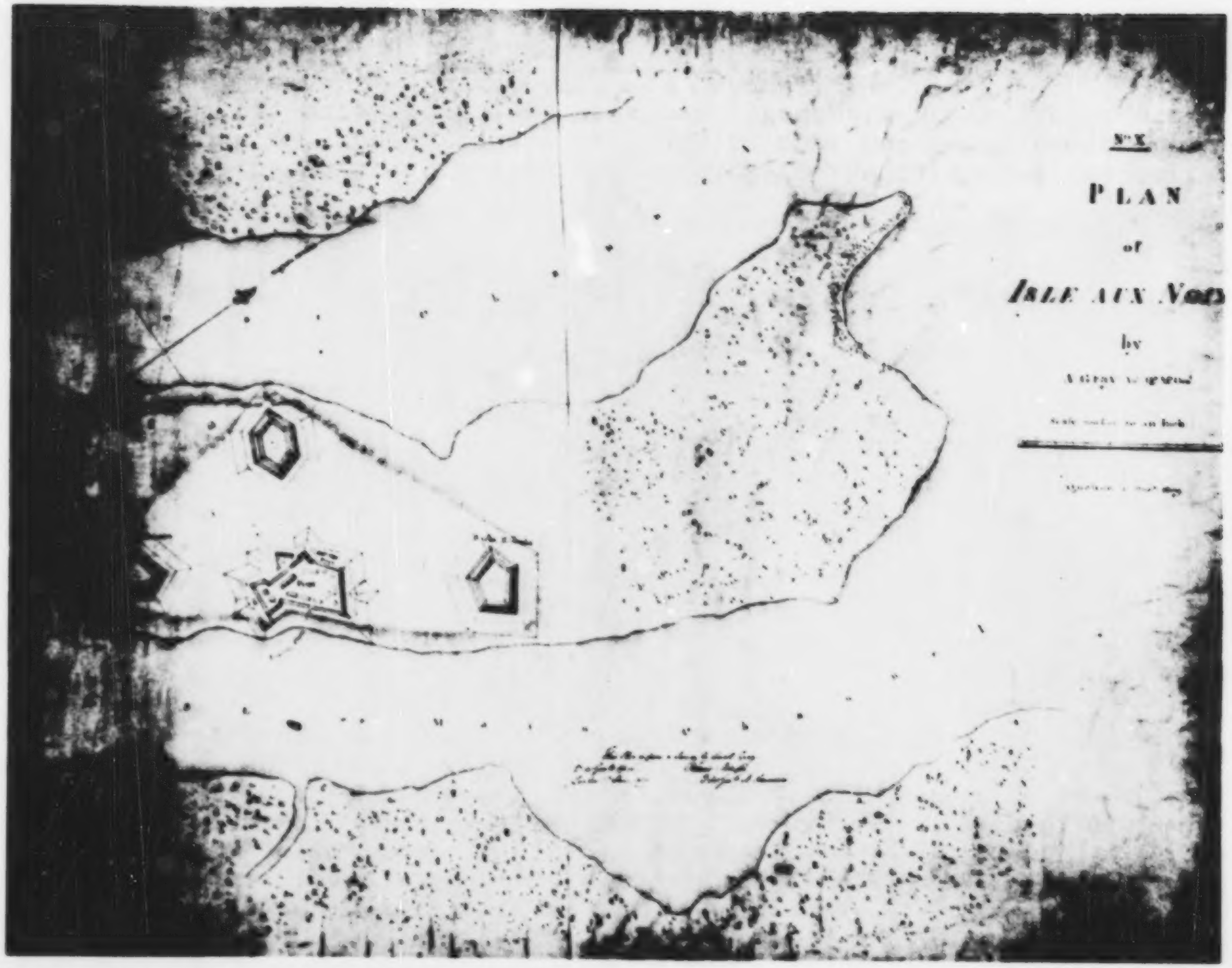
Table 13. Comparison of Formula Dates and Expected Historical Dates

Stratigraphic Unit	Ceramic Model Formula Date	+SD Range	Limit	Historical Model Alternative Expected Spans	Expected Median Dates
Redoubt sod layer	1839.8±29	1811-1869	1862	1814-1966	1890.0
				or	
Redoubt, mixed sod refuse	1832.7±36	1798-1869	1849	1814-1870	1842.0
Blockhouse refuse	1837.8±31	1807-1869	1847		
Redoubt refuse above structural remains	1834.5±34	1800-1868	1846		
Redoubt refuse adjacent to walls	1831.1±23	1808-1854	1846		
Redoubt refuse within structural remains	1850.0±0	-1850-	1830	1814-1870	1842.0
				or	
Redoubt builders (?)/or demolition trench	1850.0±0	-1850	1820	1814-1864	1839.0
Blockhouse, inside builders' (?)/or demolition trench	1776.7±46	1731-1823	1820		
Blockhouse drains above foundation	1753.7±2	1752-1756	1700		
Redoubt blockhouse structural remains	-	-	-	1782-1813	1797.5
Blockhouse builders' trench	1815.0±0	-1815-	1780	1782-1783	1782.5

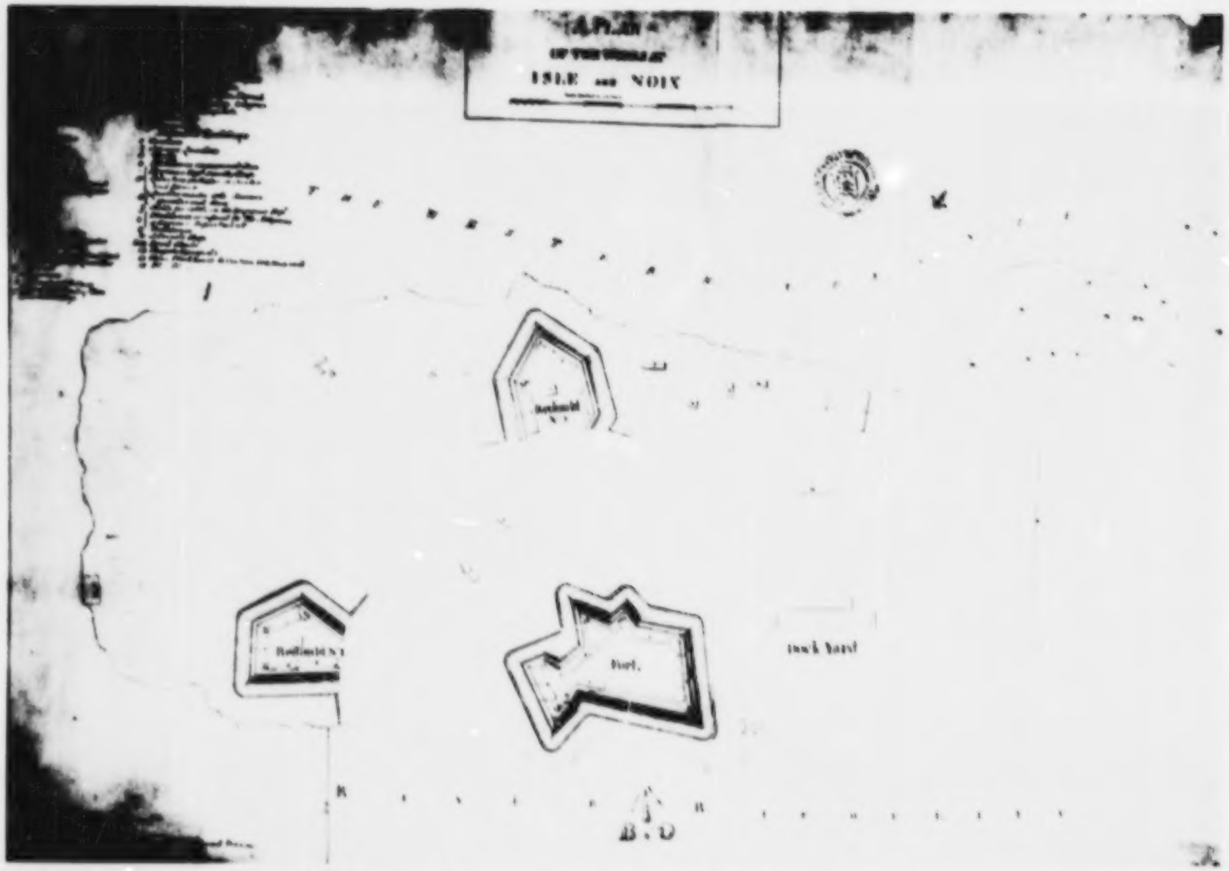
ILLUSTRATIONS

Symbols Used

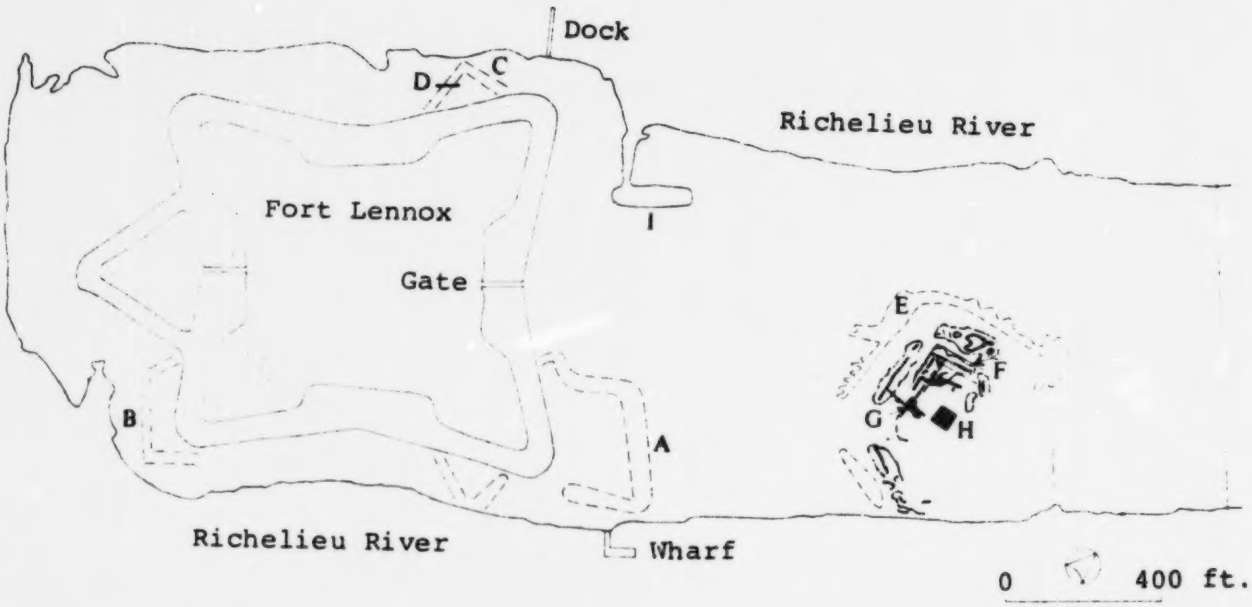
▭	Excavation limits
⁘	Mortar
░	Clay
░	Sandy Clay
▓	Loam
⁖	Rubble
□	Light sandy fill
▒	Stained soil
┼	Sod
▨	Builder's trench
◌	Post hole
∿	Wood
┄	Possible continuation of rotted wood
▵	Brick and brick rubble
○	Stone
●	Corner stone
∼	Resistivity patterns
〜	Resistivity patterns
↺	Resistivity patterns
━	1966 excavations
⊏	Crop mark



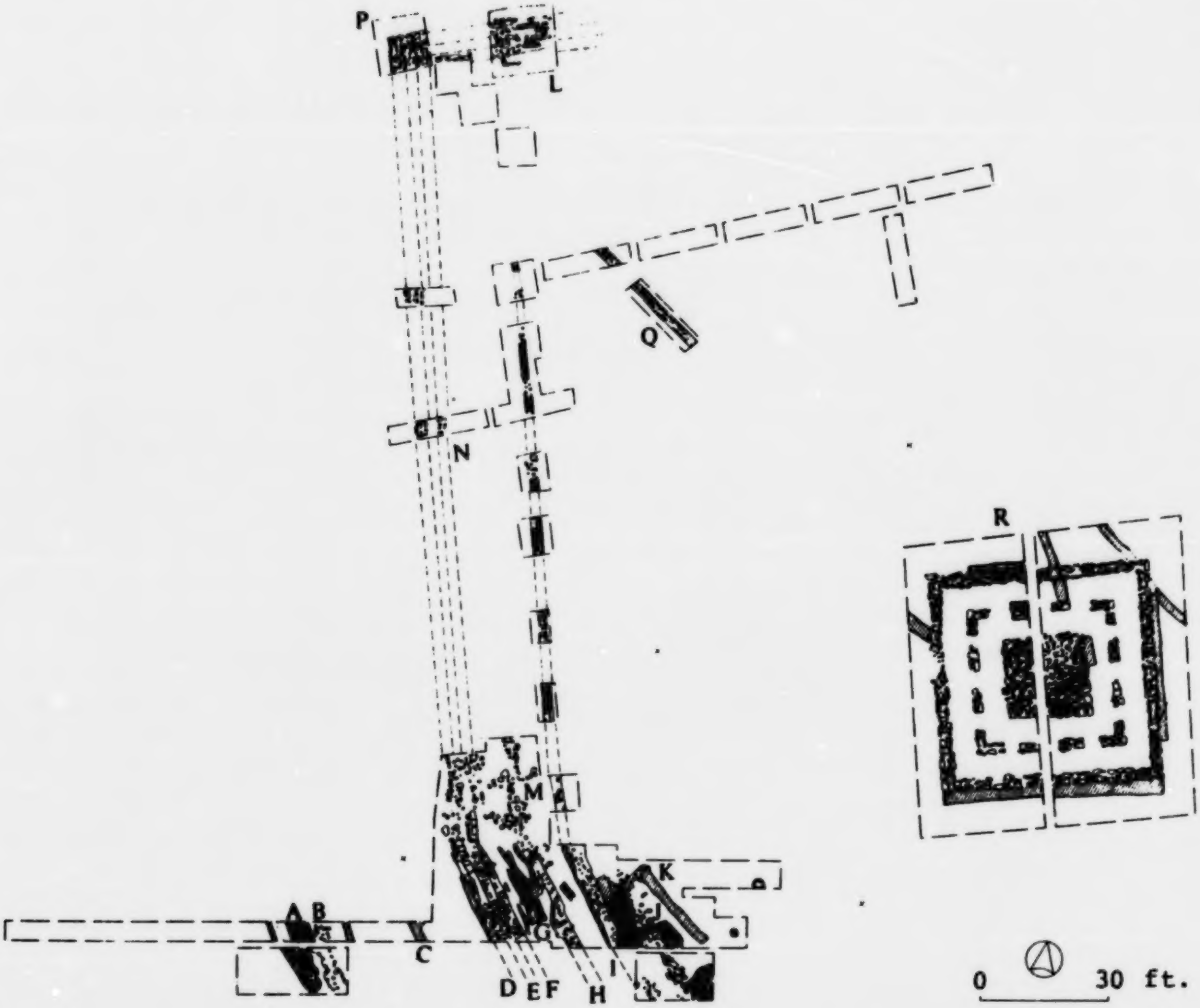
1 1809 plan of Ile-aux-Noix, showing the first British fort and the three redoubts; left, front and right. The right or northeastern redoubt is the subject of these excavations. (Public Archives Canada.)



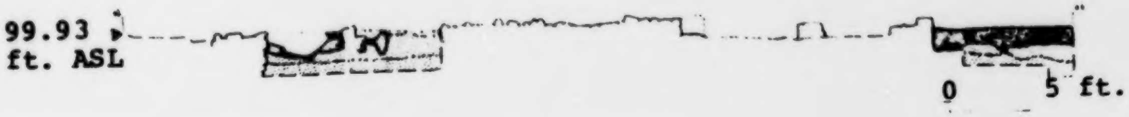
2 1814 plan of the works at Ile-aux-Noix, showing the first British fort and two redoubts. The northeast or right redoubt has been removed to make way for the naval dock yard as shown. Redoubts No. 1 (left) and No. 2 (front) remain. (Public Archives Canada.)



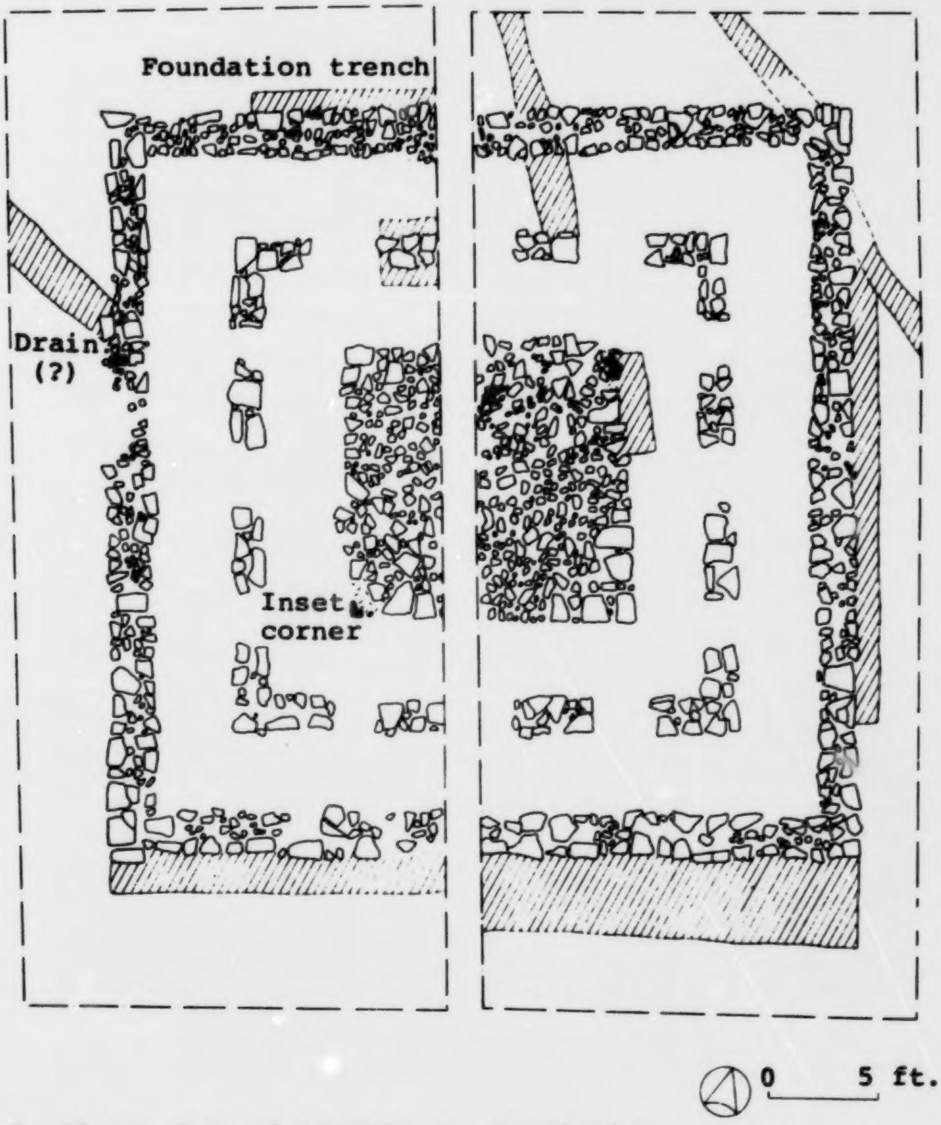
3 Archaeological site map. This map shows Fort Lennox, the Location of surface depressions related to the first British fort (A), redoubts No. 1 (B) and No. 2 (C), and the 1966 excavation of redoubt No. 2 (D). The crop mark (E) is related to the glacis/ditch area. A crop mark depicted by solid lines (F) is at the redoubt salient. The redoubt excavations (G) and blockhouse excavation (H) are show. The map also shows unfinished hornwork (I).



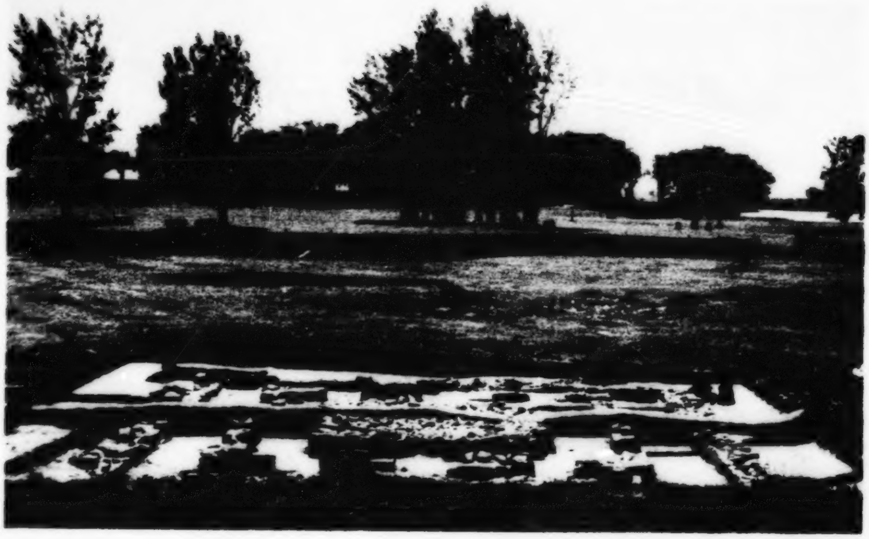
4 Excavation plan. This plan illustrates the redoubt and blockhouse excavations and structural remains: A, wood deposit; B, rock and mortar; C, soil stain; D, stone wall; E, cobble drain; F, stone wall; G, rotted wood; H, foundation rubble; I, rock and mortar; J. stone/brick drain; K, soil stain, L, right-angled alignment of stones; M, right-angled foundation; N, wall line; P, corner; Q, drain; R, blockhouse.



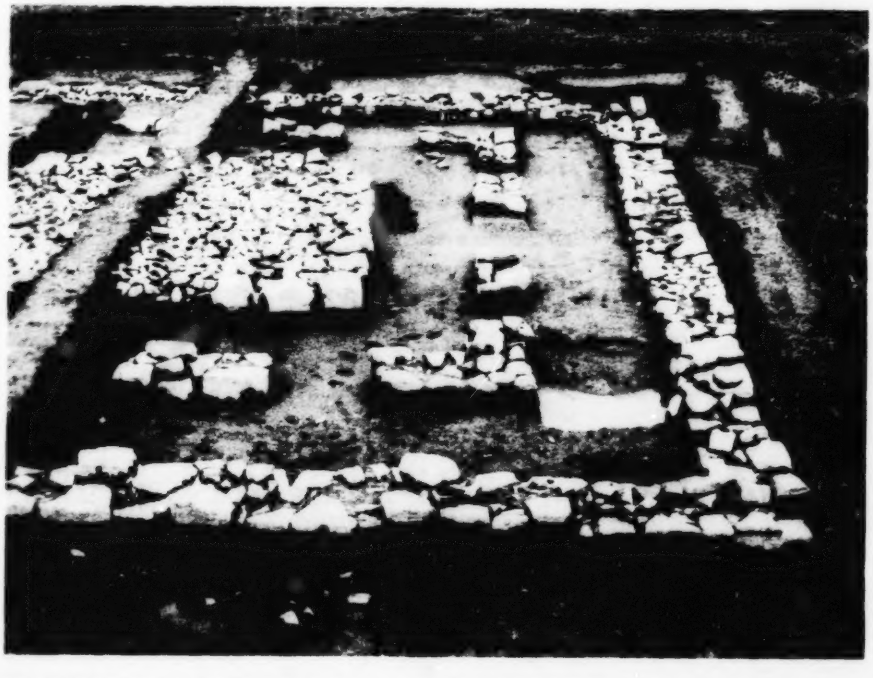
5 Stratigraphic profile of the blockhouse.



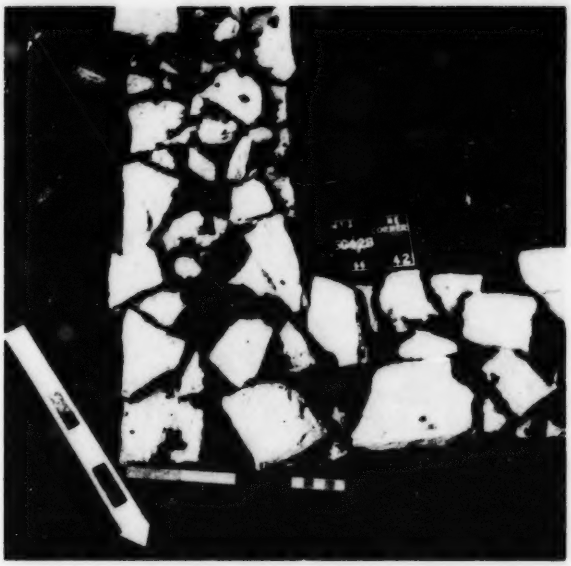
6 Floor plan of blockhouse foundation.



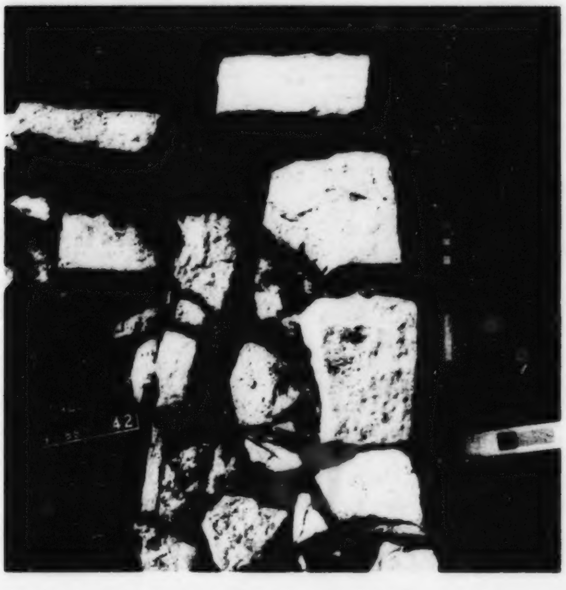
7 Blockhouse foundation. General view towards the southwest showing the entire foundation.



8 Blockhouse foundation, eastern half. View towards the northwest showing the eastern half of the blockhouse.



9 Bonded blockhouse foundation corner. View of the northeastern corner showing bonded construction of the foundation.



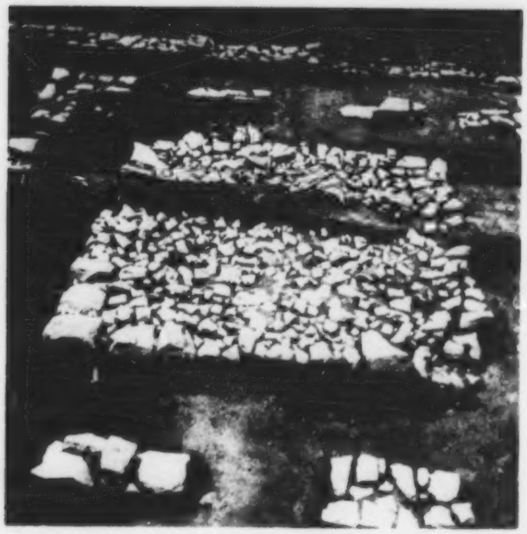
10 Butted foundation corner. View of the southeast foundation corner showing the butted construction of the foundation wall.

11 Blockhouse foundation footer. View towards the west of the west foundation corner showing the footer along the inside of the foundation wall.

12 Blockhouse foundation builder's trench. View towards the west showing the soil stain of a builder's trench along the exterior foundation wall.

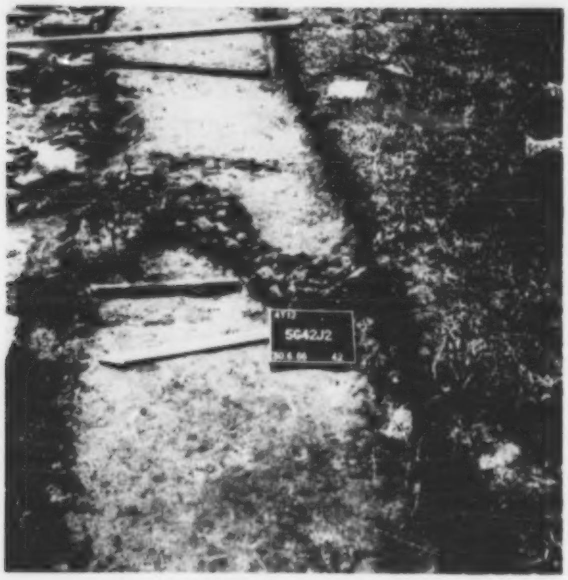
13 Blockhouse foundation builder's trench. View towards the southeast showing stained soil in a foundation builder's trench.

14 Northeast corner of the blockhouse foundation. View towards the northwest showing builder's trench and later drain. The builder's trench is along the foundation wall in the lower left. The drain line is seen in the right and cutting through the foundation stones, centre.

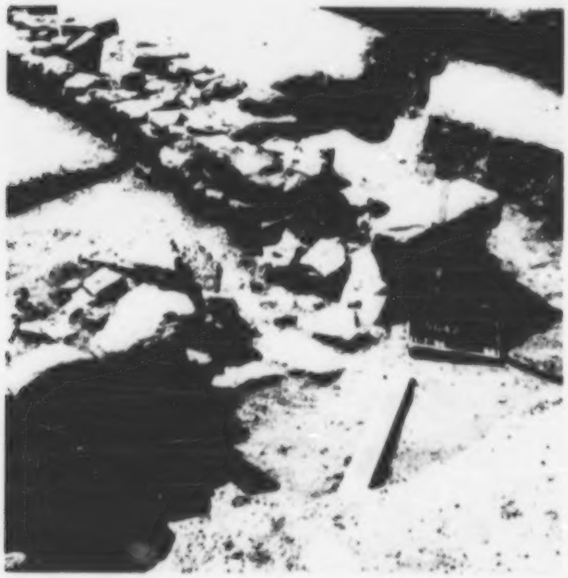


15 The central platform of the blockhouse. View towards the southwest showing the central platform. Note the inset socket in the northeast corner of the platform and the foundation builder's trench adjacent to the platform.

16 Corner of blockhouse platform. View towards the northwest showing the inset socket in the southeast corner of the central platform.



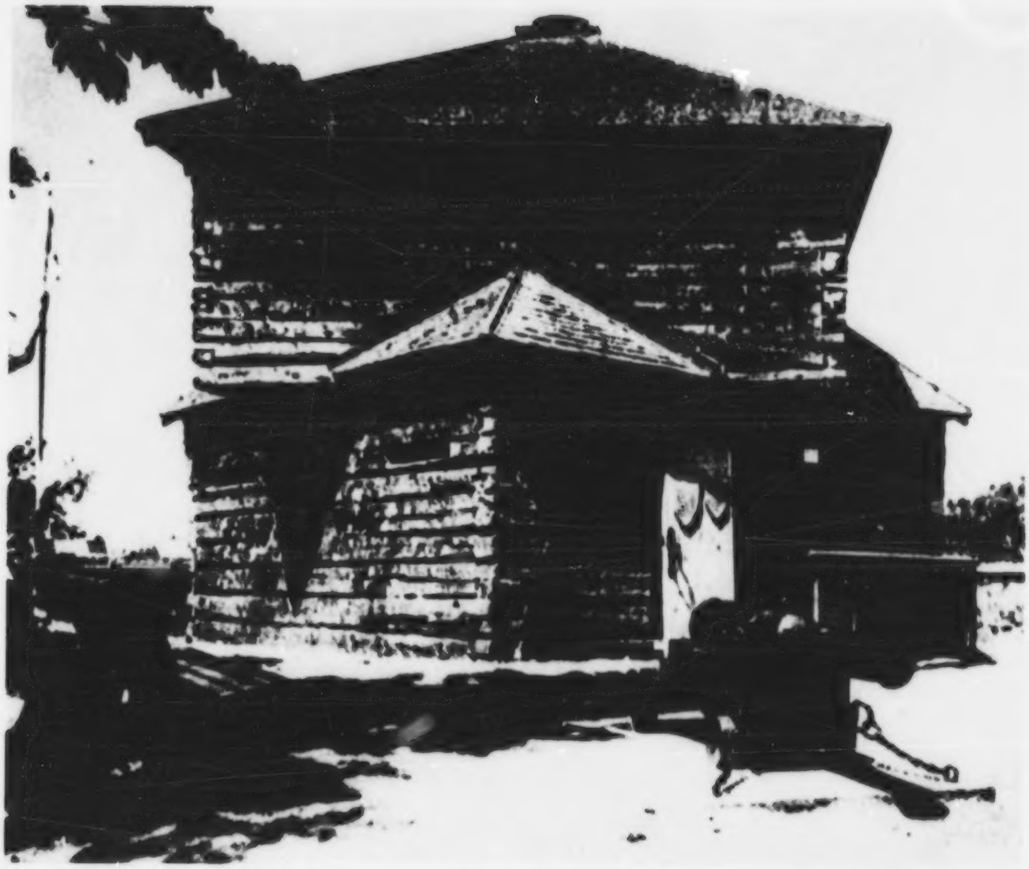
17 Post-blockhouse ditch fill. View towards the east showing the refuse fill of a later ditch line outside and stratigraphically above the blockhouse foundation.



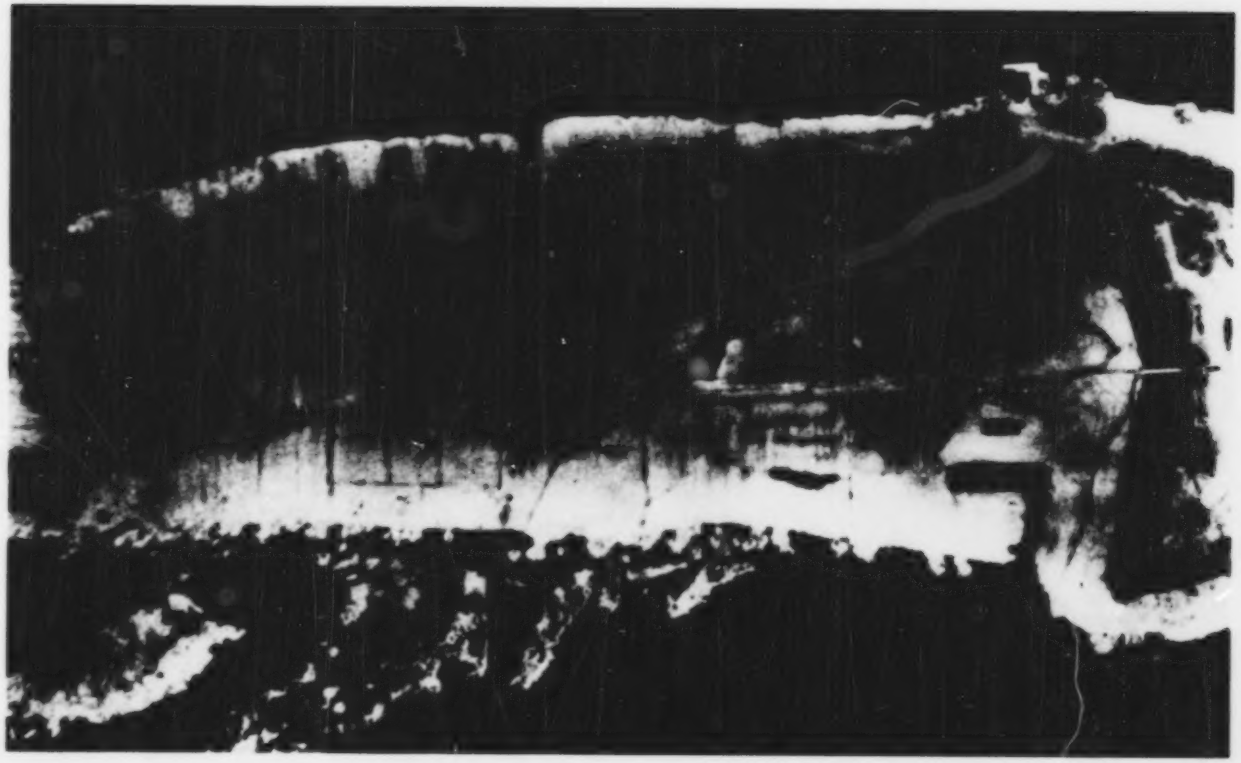
18 Blockhouse corner cut by ditch. View towards grid north showing ditch line cutting through the north corner of the blockhouse foundation.

19 Post-blockhouse drain (?). View towards the southeast showing an unidentified stained soil feature crossing the foundation wall.

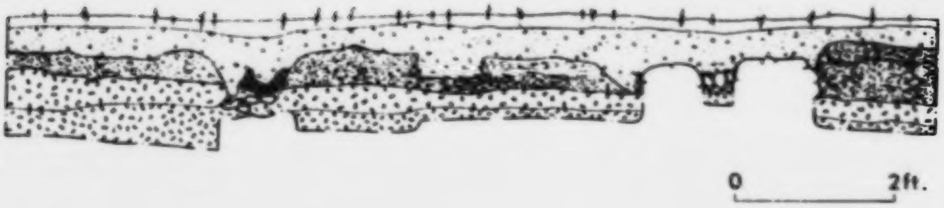
20 LaColle blockhouses.



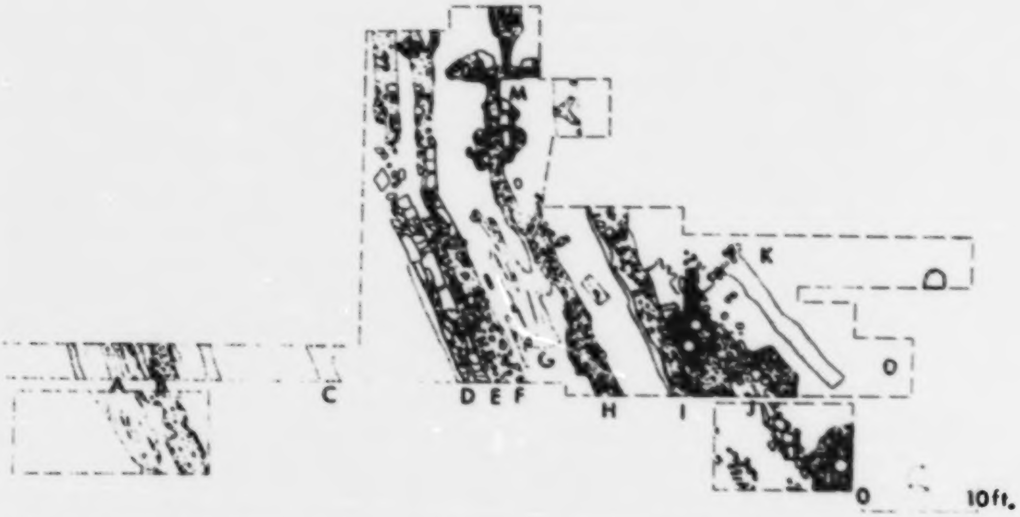
21 Ile Sainte-Hélène blockhouse.



22 Infra-red air photo of Ile-aux-Noix. The pentagonal outline of the redoubt is clearly visible in the centre of the island (Ashworth 1967: 7, Fig. 1-1).

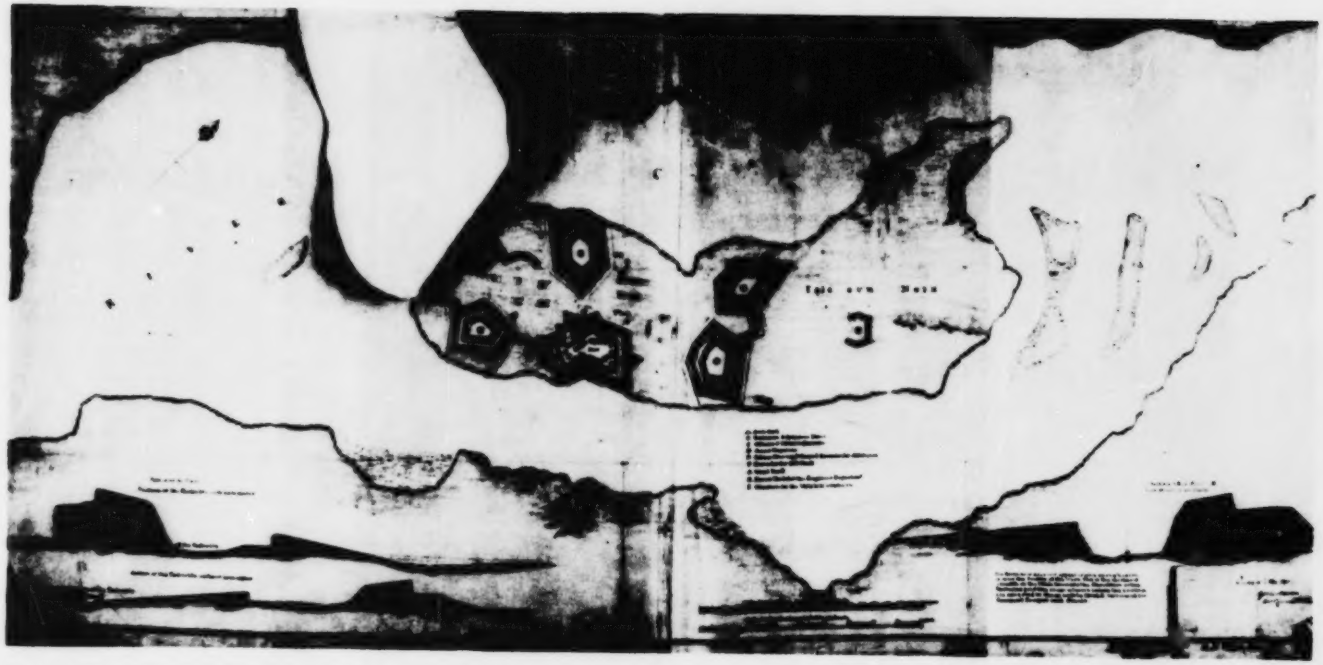


23 Stratigraphic profile of the redoubt. This cross-section illustrates the major casemate foundation structures.

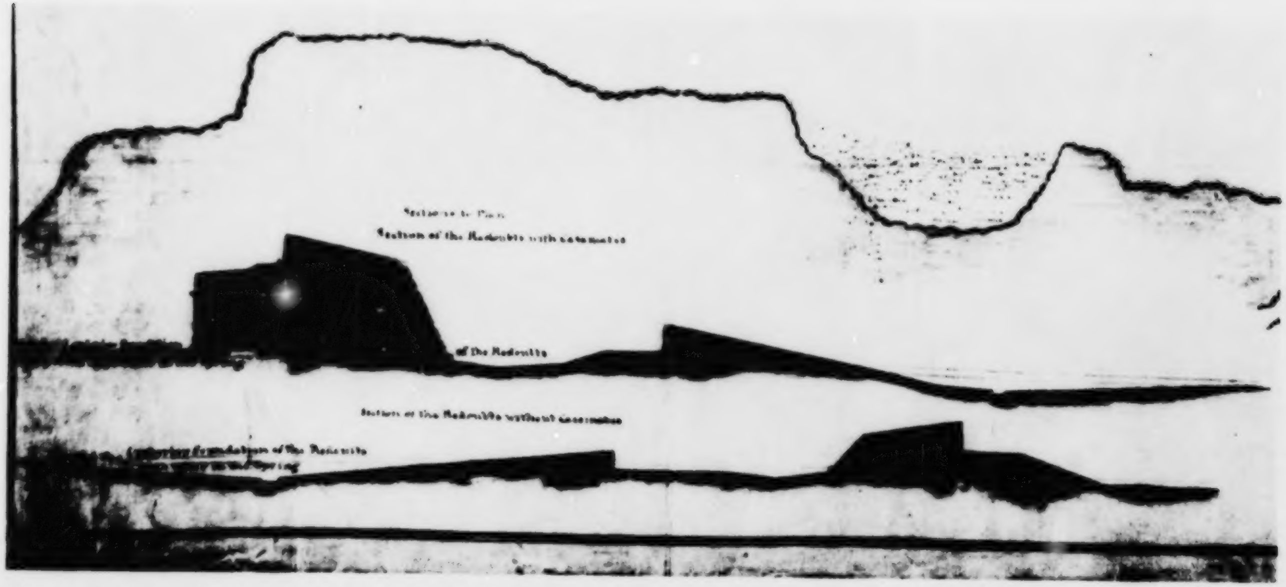


24 Floor plan of the major redoubt excavations: A, wood deposit; B, rock and mortar; C, soil stain; D, stone wall; E, cobble drain; F, stone wall; G, rotted wood; H, foundation rubble; I, rock and mortar; J. stone/brick drain; K, soil stain; M, right-angled foundation.

25 General view of the redoubt excavations. View towards the south showing foundation lines in the excavation which was a cross-section of the redoubt.

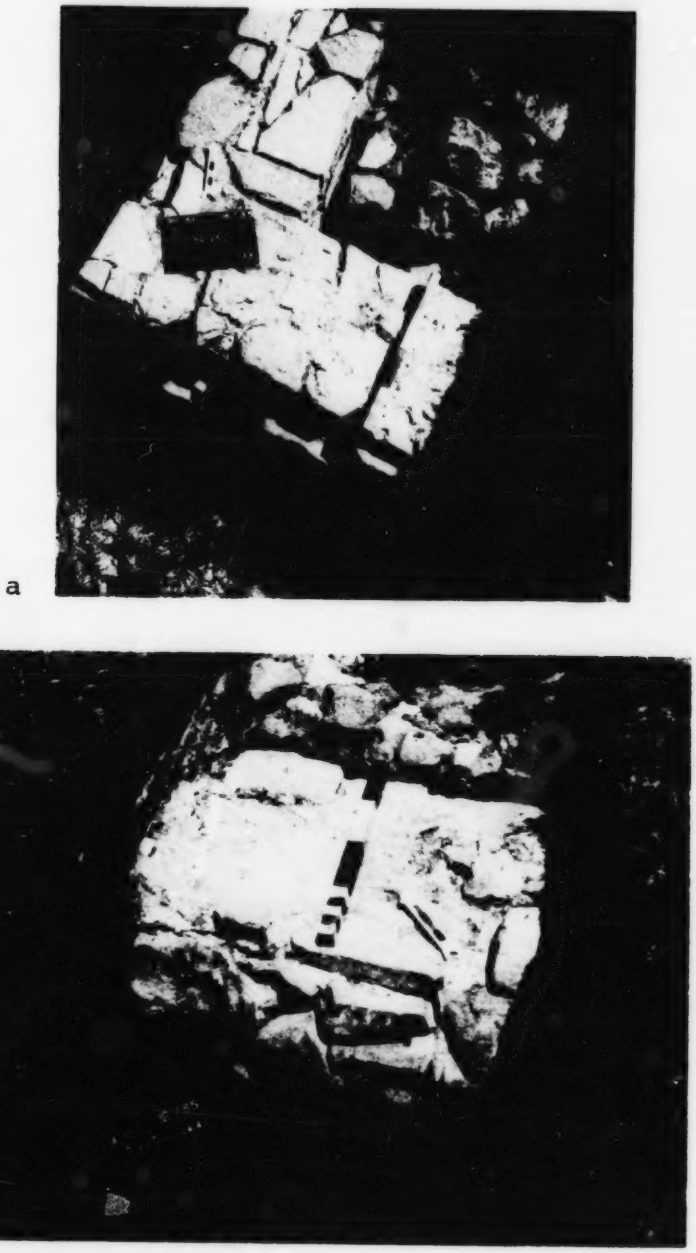


26 1790 proposed plan of Ile-aux-Noix. This plan illustrates proposed alterations in the Ile-aux-Noix fortification system. The additional redoubts were never constructed. (Public Archives Canada.)

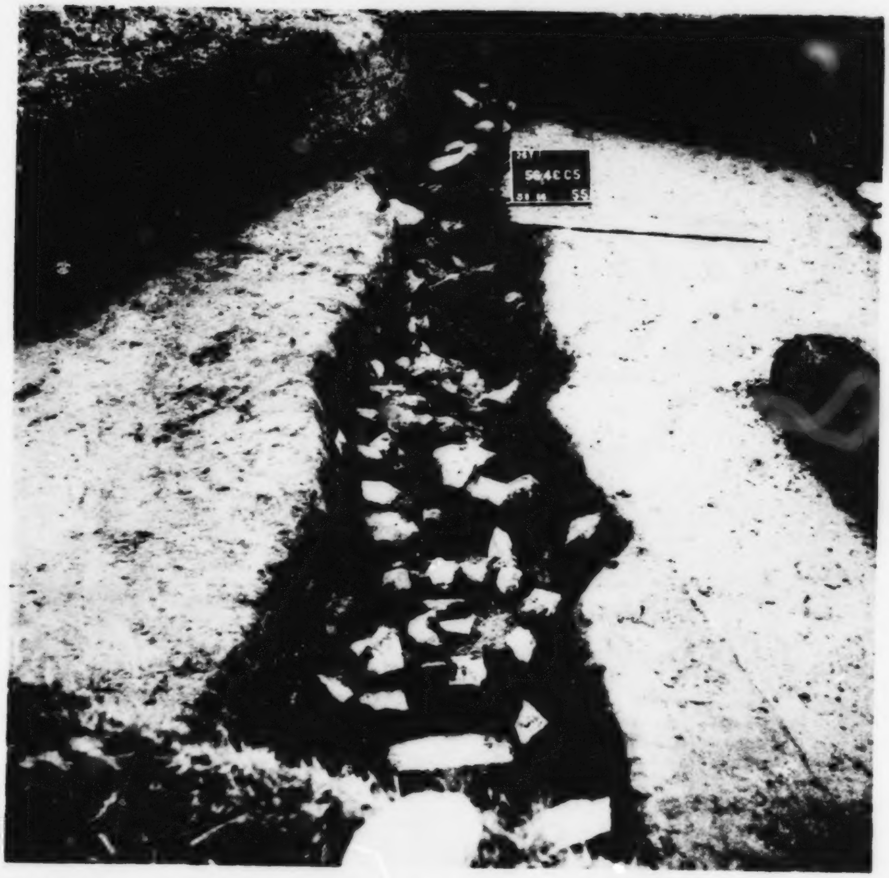

Section of the Redoubts with casemates
of the Redoubts
Section of the Redoubts without casemates
foundations of the Redoubts

27 Elevation of the redoubt casemates. Taken from the 1790 proposed plan, this sectional elevation of the redoubt casemate includes structural features found in excavations and may be used as a guide to the appearance of the redoubt structure.

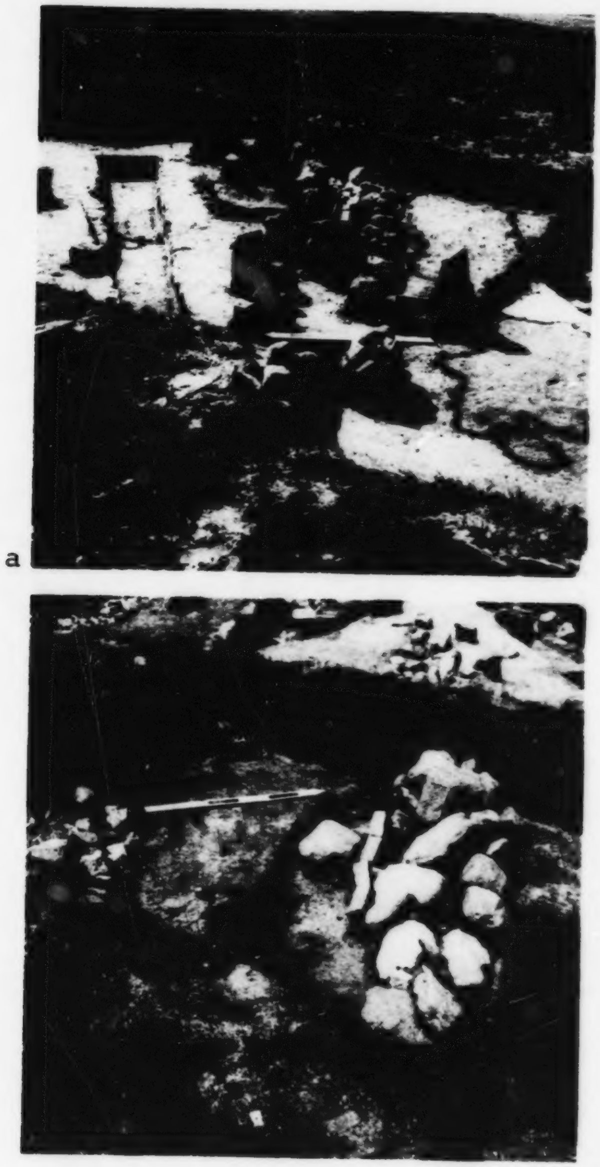
28 Casemate foundation. View towards the east showing structural features of walls D, E and F.



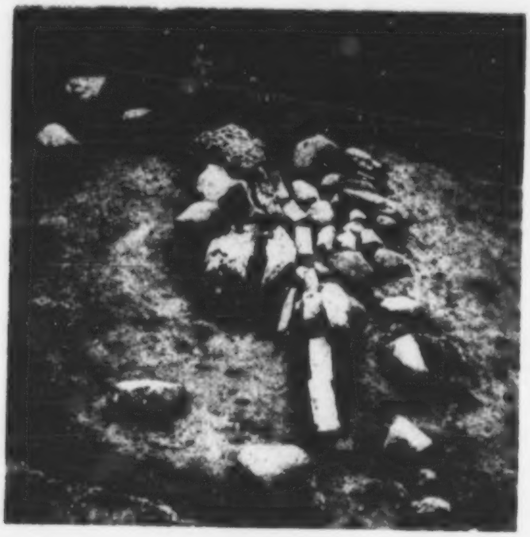
29 Redoubt foundation views: a, view of the redoubt corner showing features of walls D, E and F; b, view towards northeast showing a section of the D, E and F wall lines exposed along the redoubt (Ashworth 1967: 106, Fig. 5-3).



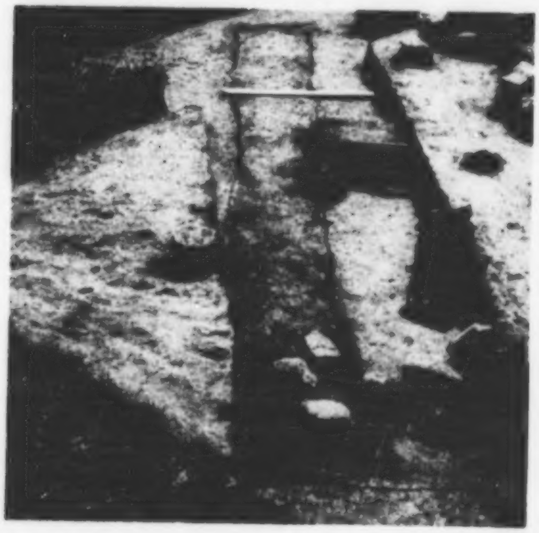
30 Redoubt casemate feature. View towards the northeast showing wall feature I with rubble *in situ* after excavation.



31 Redoubt features. a, view towards the east showing the rock rubble with bricks on edge (wall line J, and related soil stains); b, view toward the west showing wall line J brick features along rock line, and soil stains.

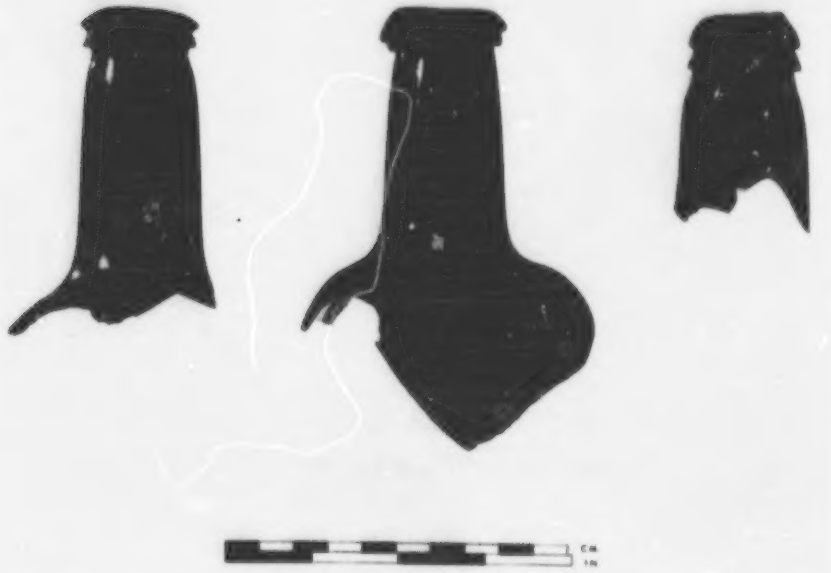


32 Redoubt rubble and brick drain (J) showing line of brick on edge in rubble drain.

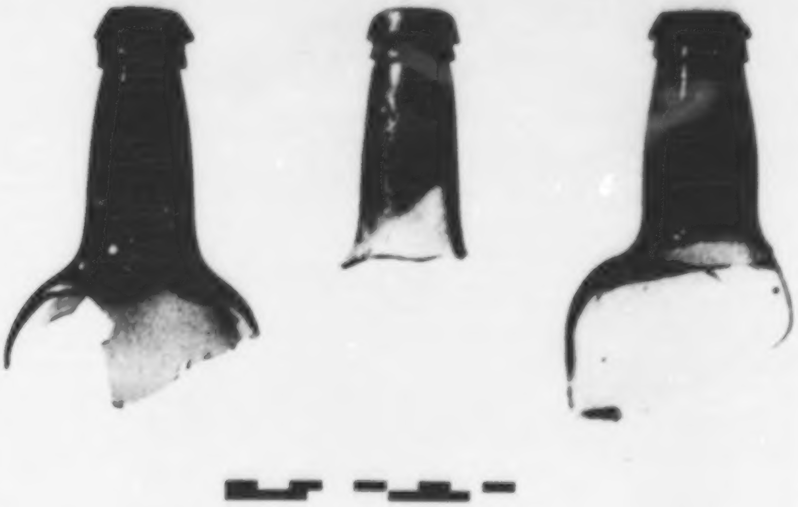


33 Redoubt soil feature. View towards the east showing a soil stain feature (K) in the redoubt excavations.

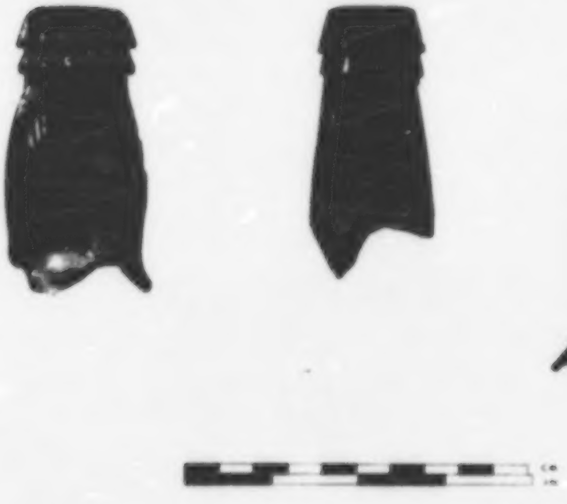
34 Redoubt wall (?). View of rubble in right-angled orientation (Ashworth 1967: 103, Fig. 5-1).



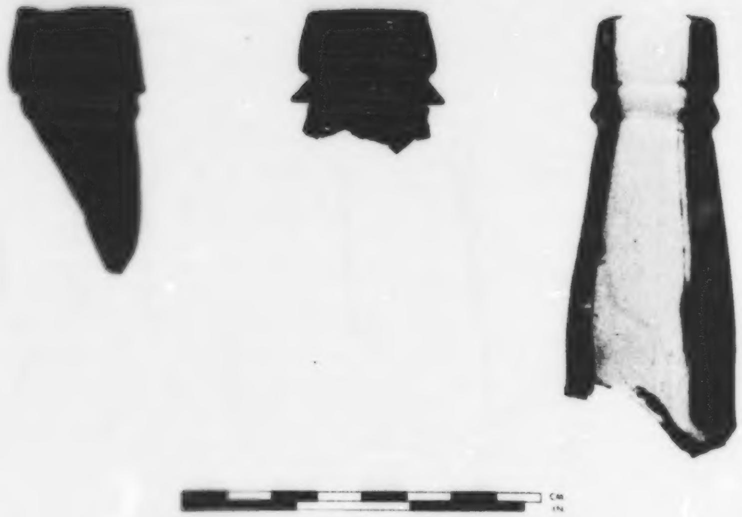
35 Bottle finishes: a, type 1; b, type 2; c, type 3.



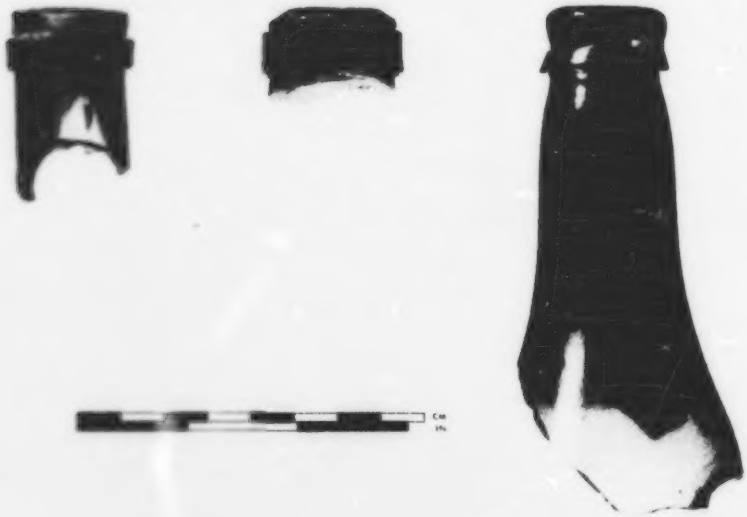
36 Bottle finishes: a, type 4; b, c, type 5.



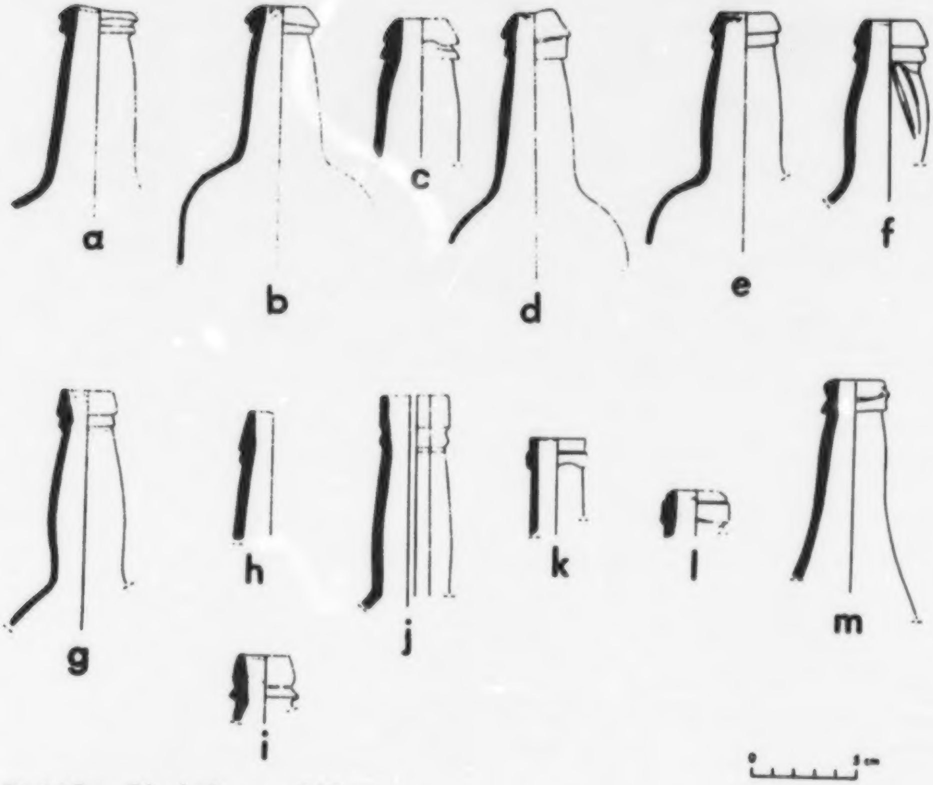
37 Bottle finishes: a, b, c, type 6.



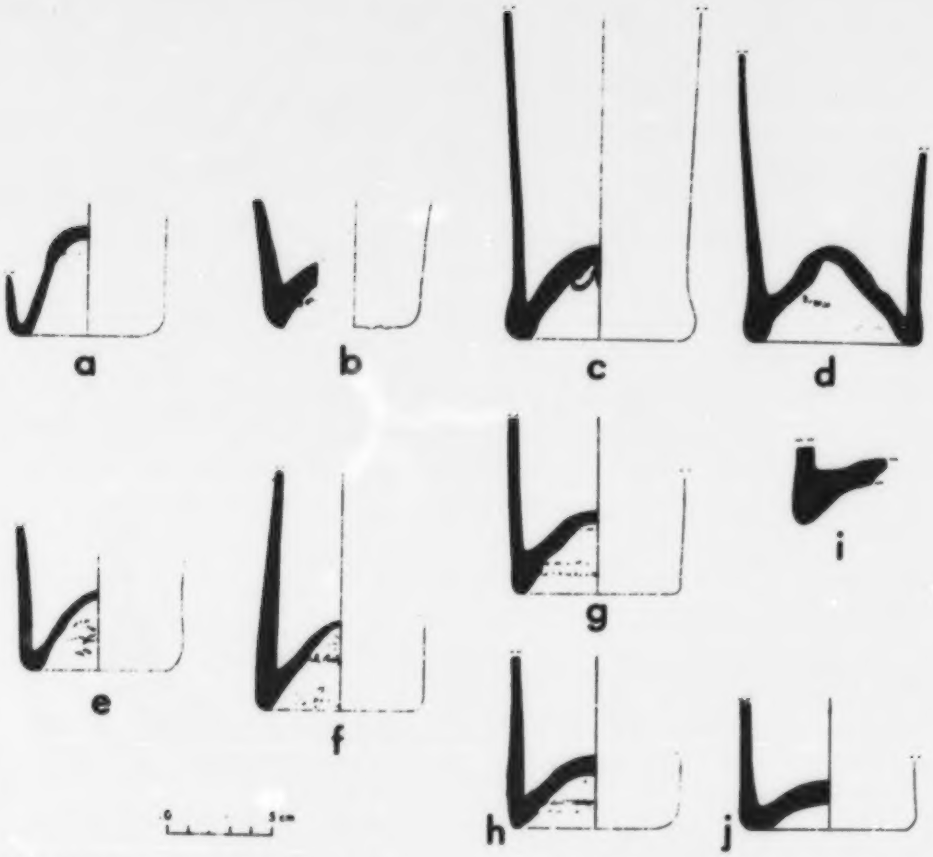
38 Bottle finishes: a, type 8; b, type 9; c, type 10.



39 Bottle finishes: a, type 11; b, type 12; c, type 13.



40 Bottle finish profiles.



41 Bottle base profiles.

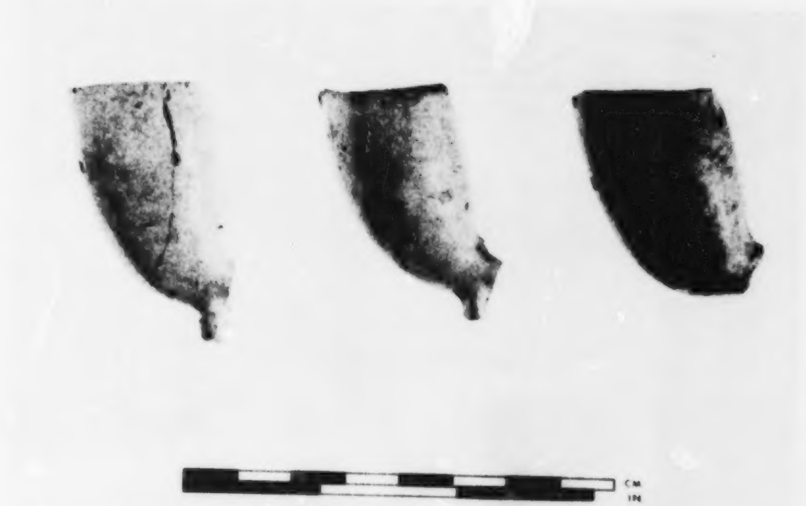
42 Square-sectioned bottle base.

43 Clay pipe mouthpieces: a, bit; b, secondary; c, original; d, red waxed; e, brown glazed; f, secondary, tapered.

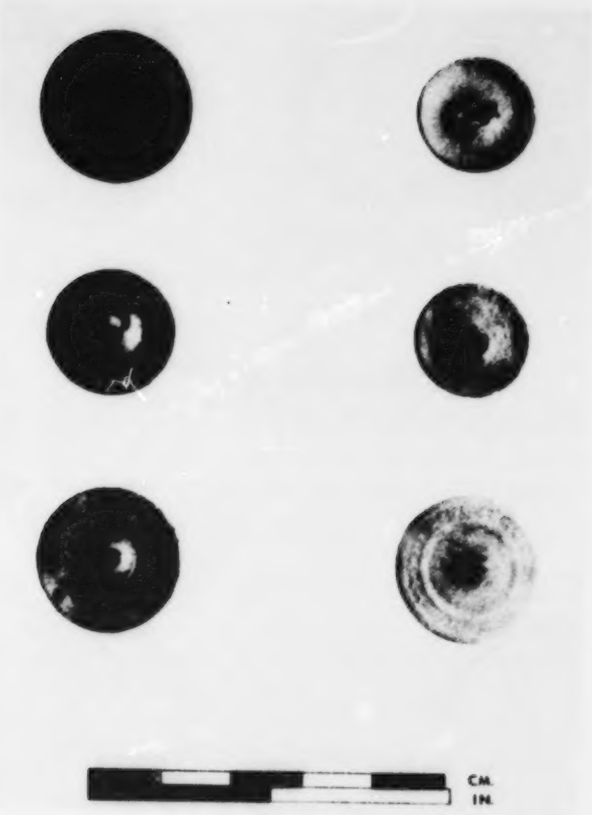
44 Marked pipe stem fragments: a, Coghill; b, W & D Bell; c, McDougall; d, Bannerman; e Henderson.

45 Decorated pipe bowl fragments: a, masonic emblem; b, fluted; c, masonic.

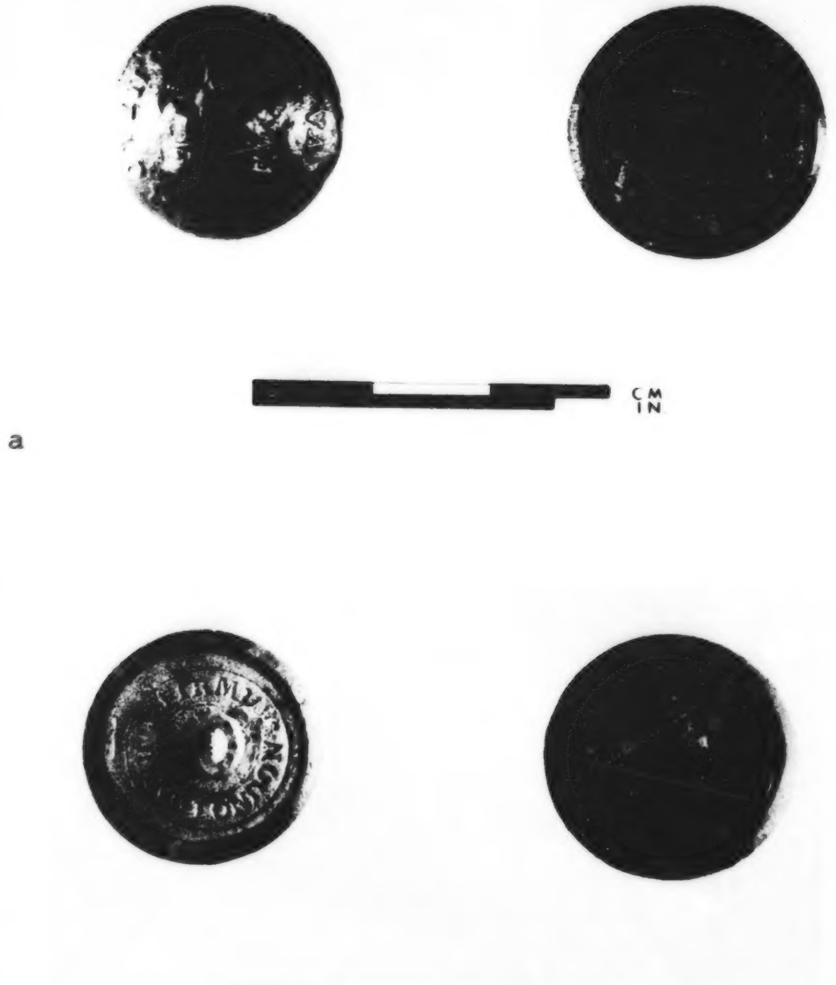
46 TD marked pipe bowl fragments: *a*, raised letters, TD; *b*, impressed letters, TD; *c*, impressed TD in wreath.



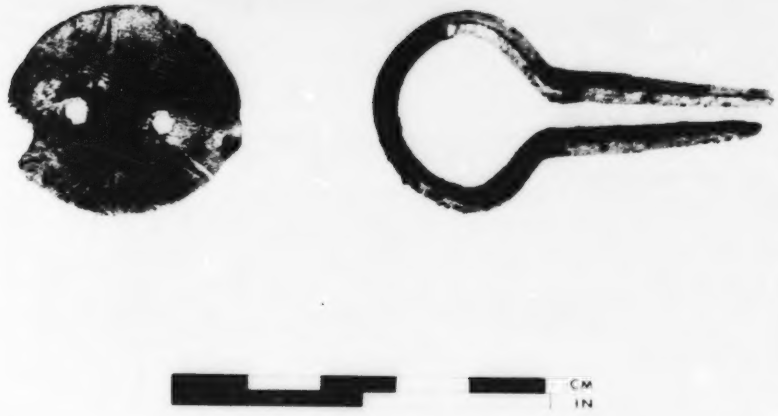
47 Clay pipe bowls: *a*, TD moulded (raised); *b*, plain, with spur; *c*, plain, without spur.



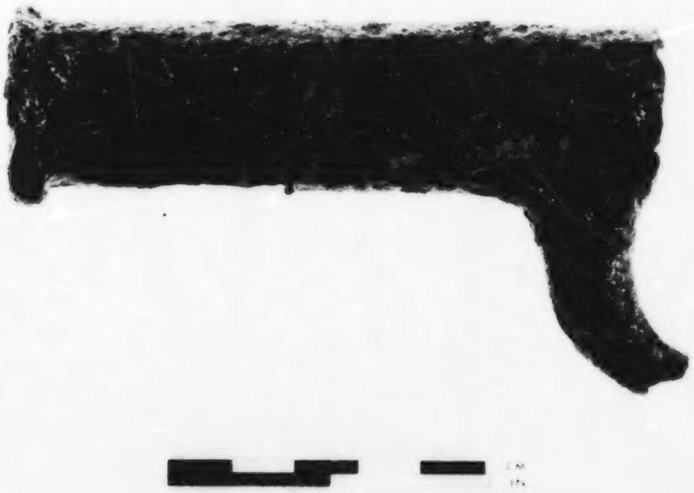
48 Button backs: a, medical staff, two-piece, brass; b, c, d, f, plain, brass; e, plain pewter.



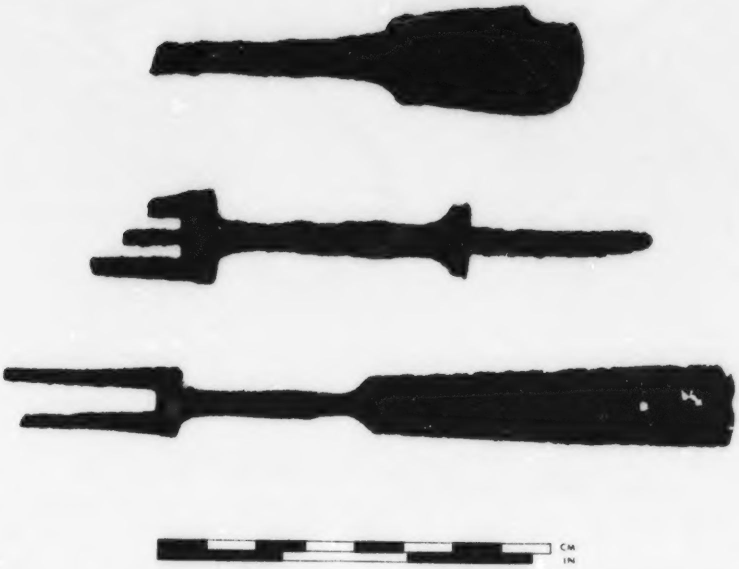
49 Two-piece buttons: a, provincial cavalry; b, medical staff.



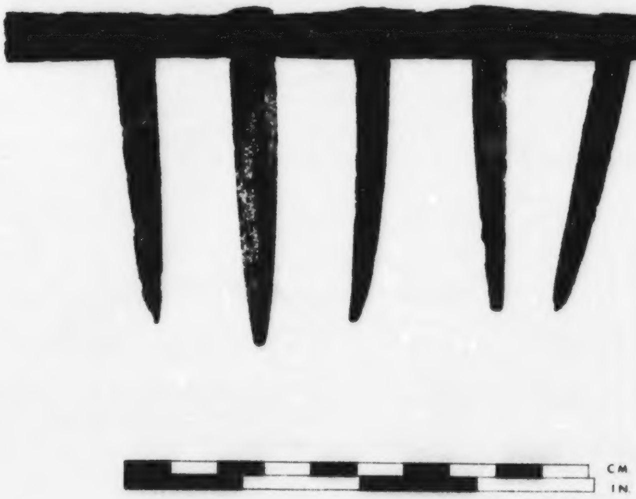
50 Miscellaneous artifacts: a, lead buzzer; b, Jew's harp.



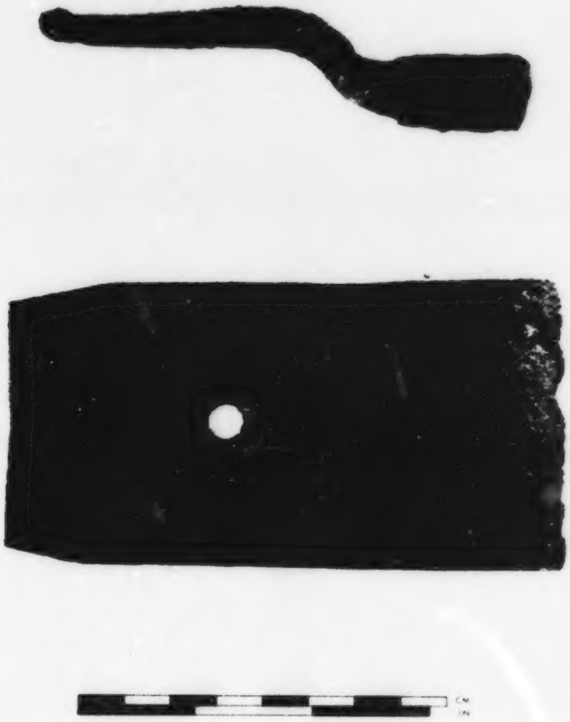
51 Iron bayonet.



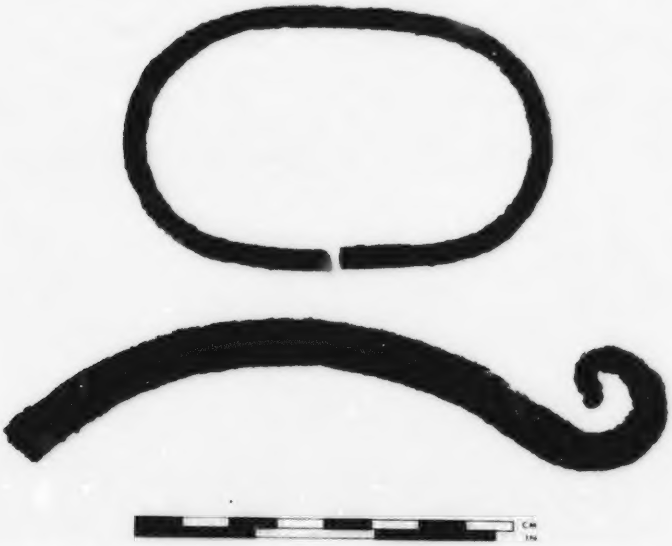
52 Forks: a, handle fragment; b, three-tined; c, two-tined.



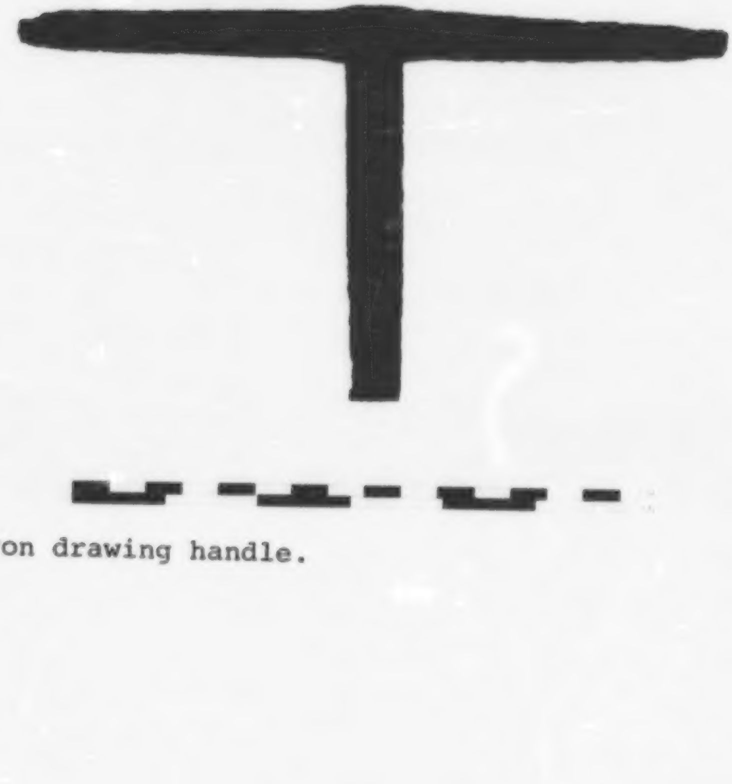
53 Iron rake.



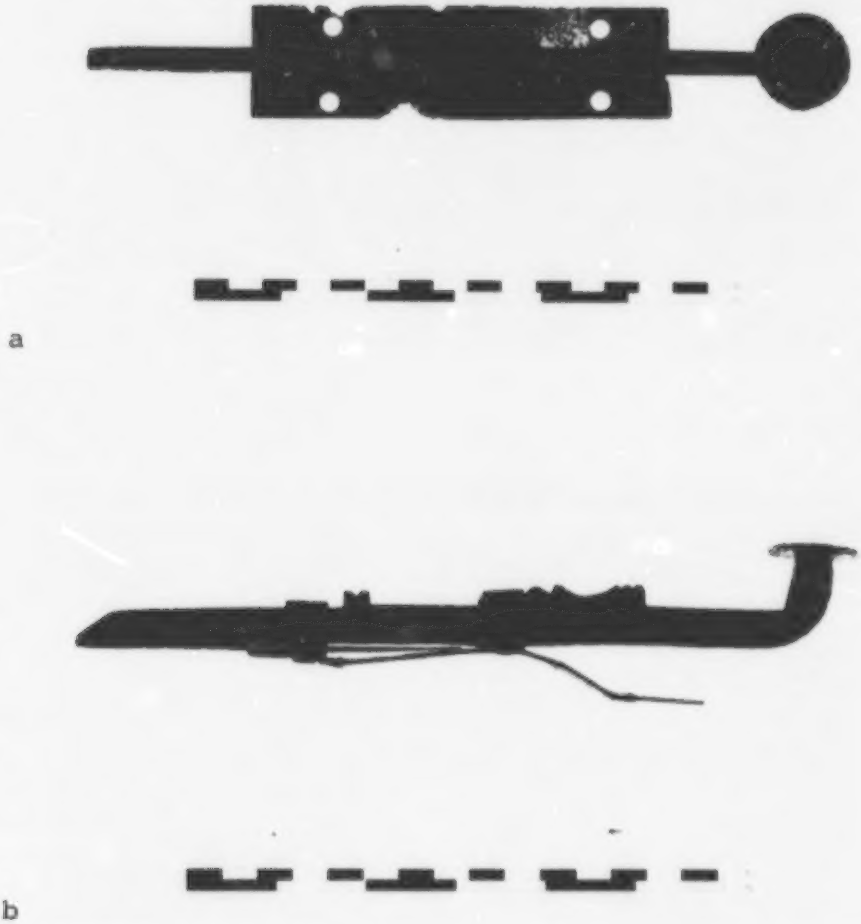
54 Iron objects: a, cleat fragment; b, plane blade.



55 Iron handles: a, small bail; b, large, bent end.

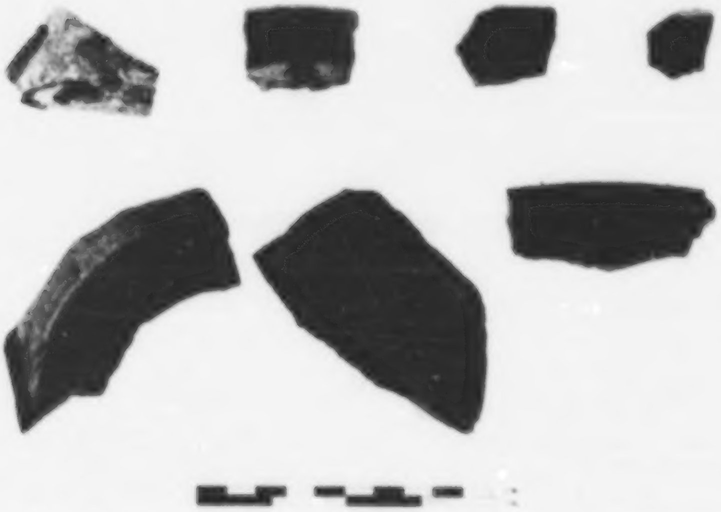


56 Iron drawing handle.

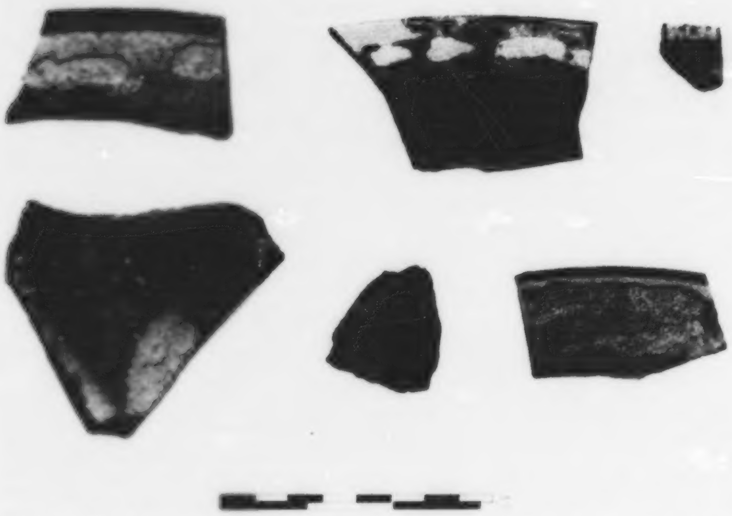


57 Latch bolt: a, top view; b, side view.

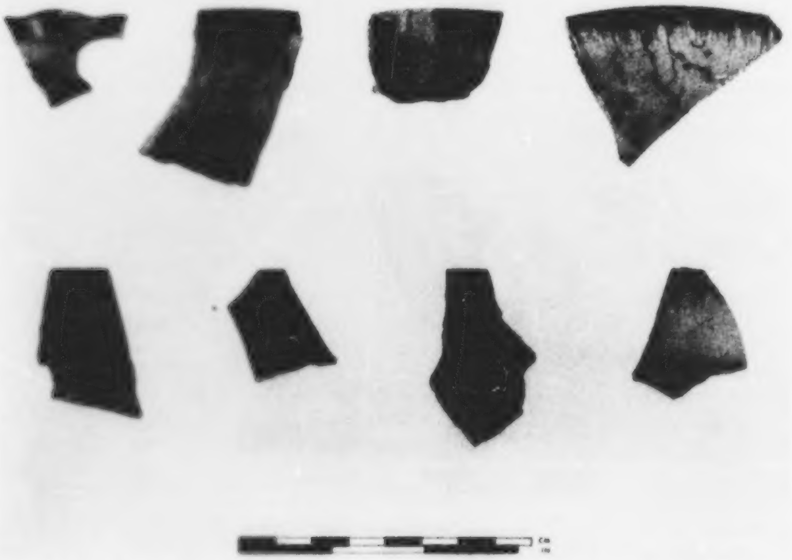
58 Coarse earthen-are: a, base, unglazed red; b, rim, unglazed red; c, brown/ olive glazed, bodysherd.



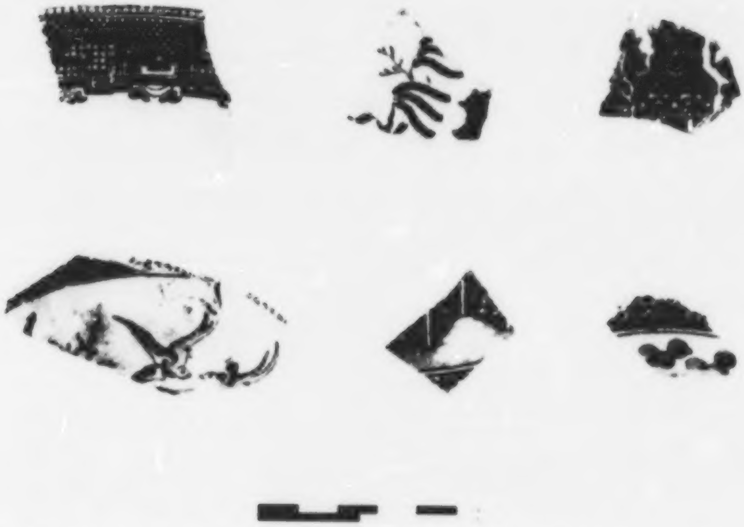
59 Coarse earthenware: a, b, c, clear glazed; d, dark brown glazed; e, f, g, brown glazed; e, exterior base; f, interior base; a, base; b, c, d, g, rims.



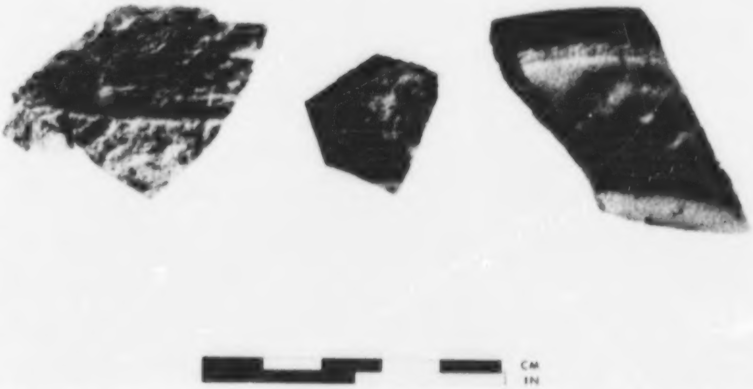
60 Slipware: a, b, c, f, rims; d, e, base fragments.



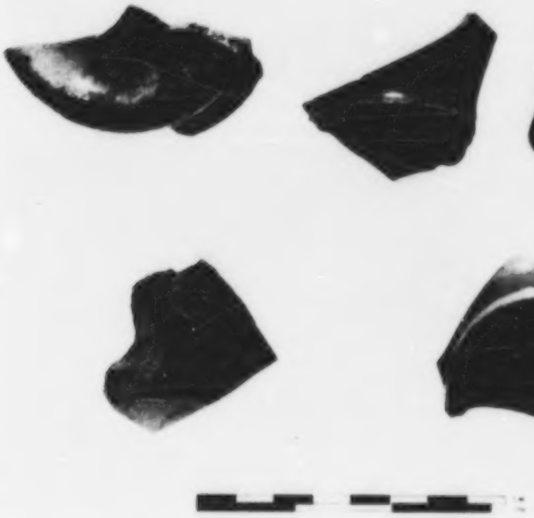
61 Shell-edged earthenware: a, green; b-h, blue.



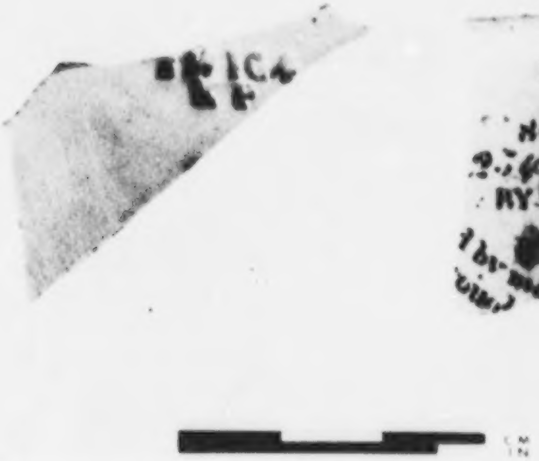
62 Blue transfer-printed pearlware, Willow pattern: a, rim; b-f, interior vessel bases.



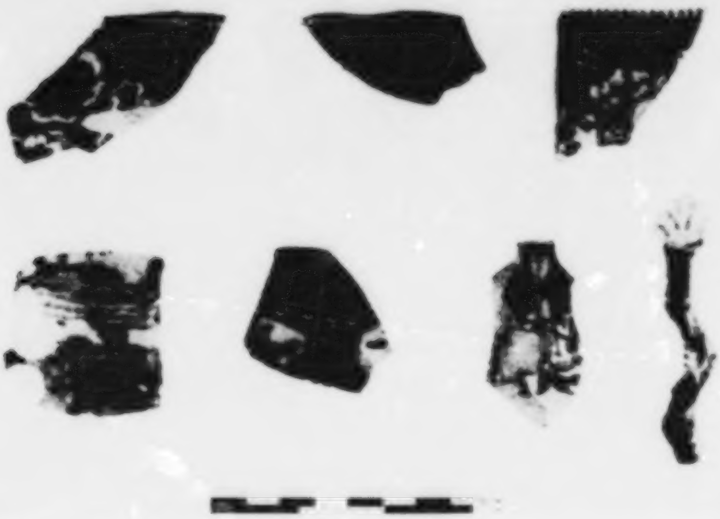
63 Moulded embossed refined earthenware: a, white; b, green; c, blue, rim.



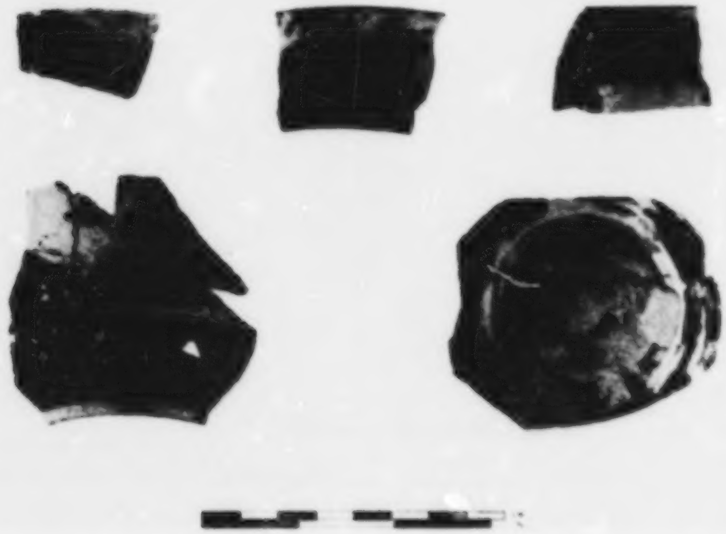
64 Refined white earthenware bases: *a*, low pedestal base; *b*, low, rounded foot ring; *c*, wedge-shaped foot ring; *d*, indented foot ring; *e*, collar-like foot ring.



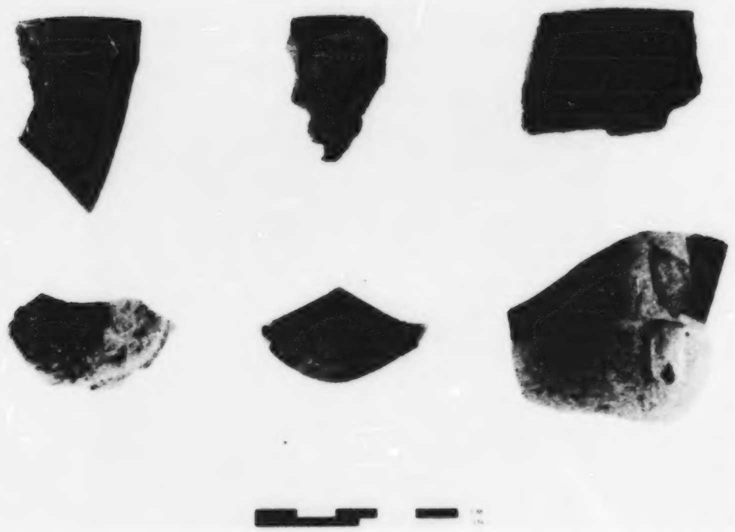
65 Refined white earthenware marks: *a*, impressed; *b*, transfer-printed label.



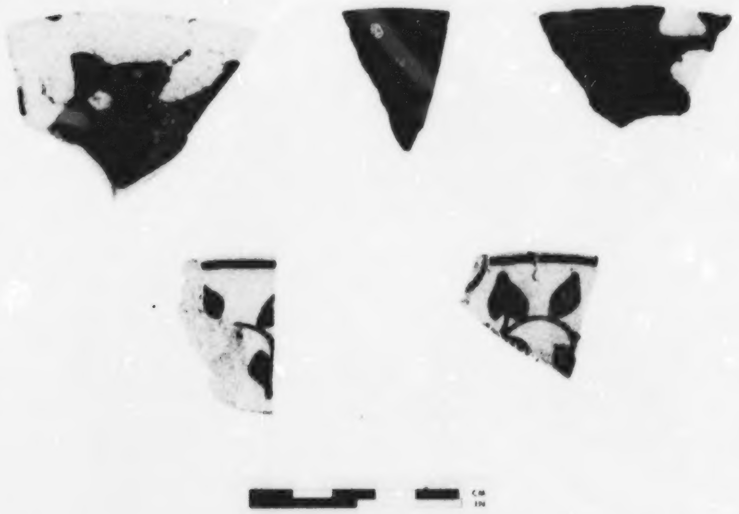
66 Blue transfer-printed earthenware rims: a-f, rims, plates; g, crabstock handle.



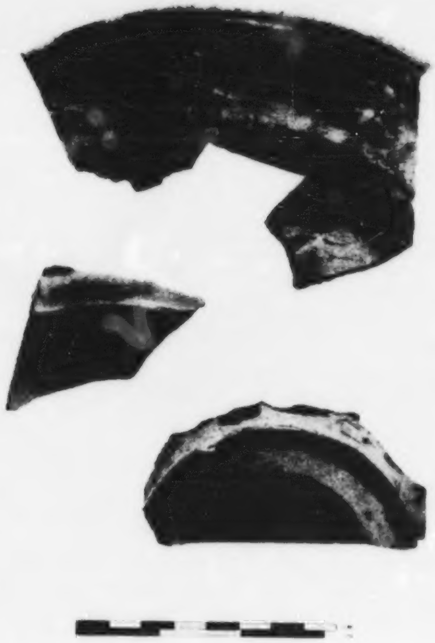
67 Blue transfer-printed earthenware cups: a-c, rims; d, base, side view; e, base, bottom view.



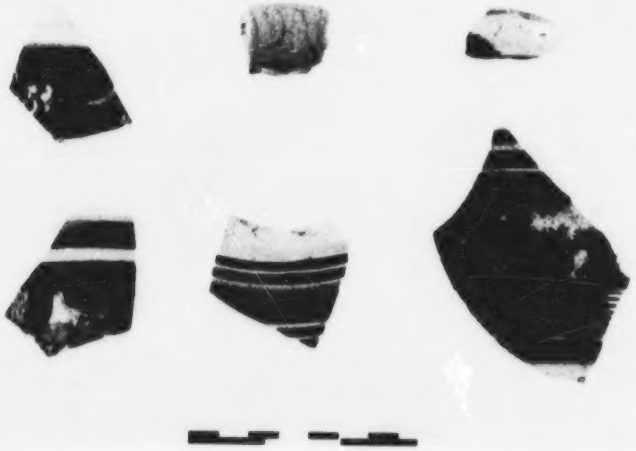
68 Sponge-decorated earthenware: *a*, blue; *b*, blue and red; *c*, blue; *d*, blue and yellow; *e*, blue and red; *f*, blue.



69 Miscellaneous earthenware: *a*-*c*, flowing blue transfer-printed plate rims; *d*-*e*, underglaze polychrome painted.



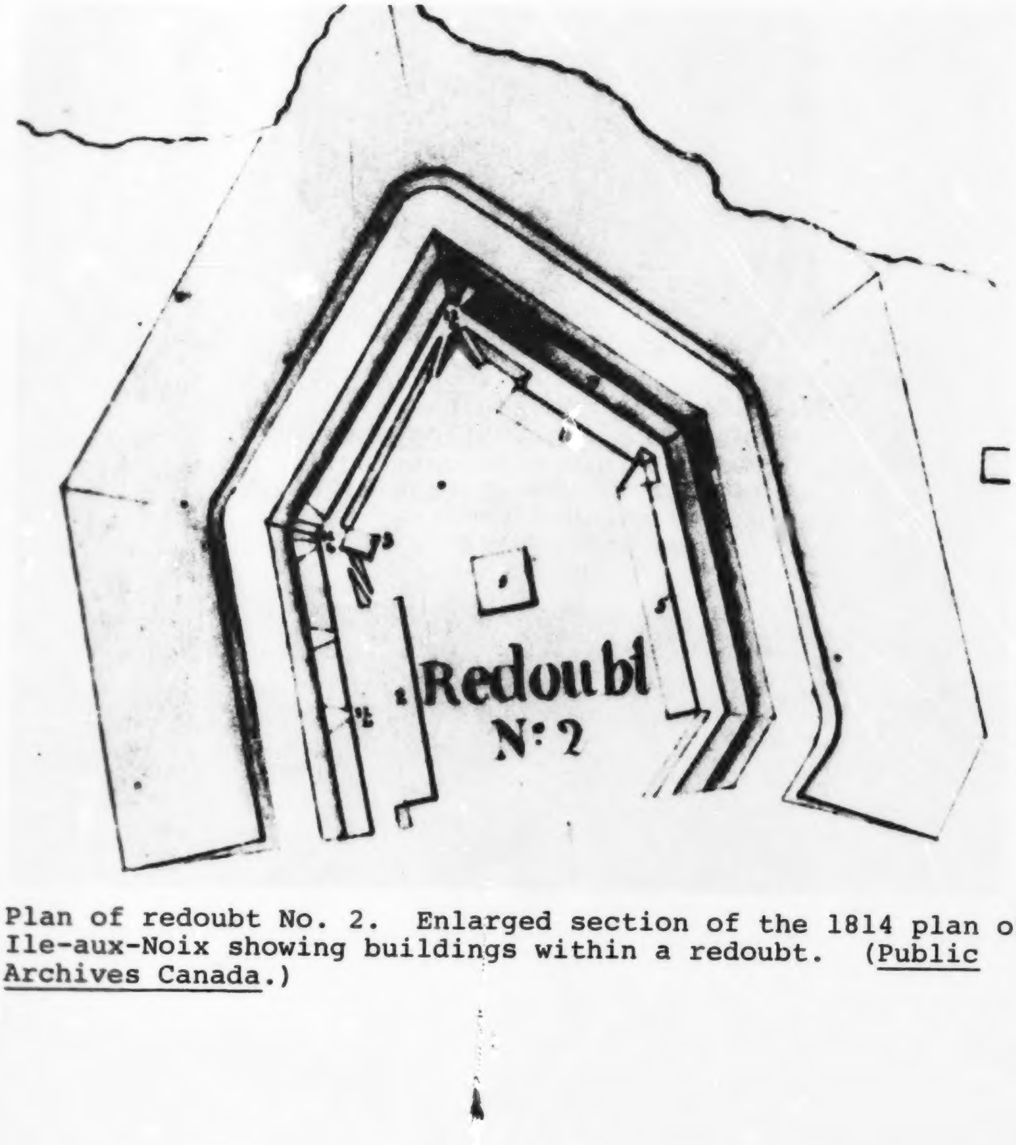
70 Ironstone: a, saucer rim and base; b, low, rounded foot ring; c, flared foot ring.



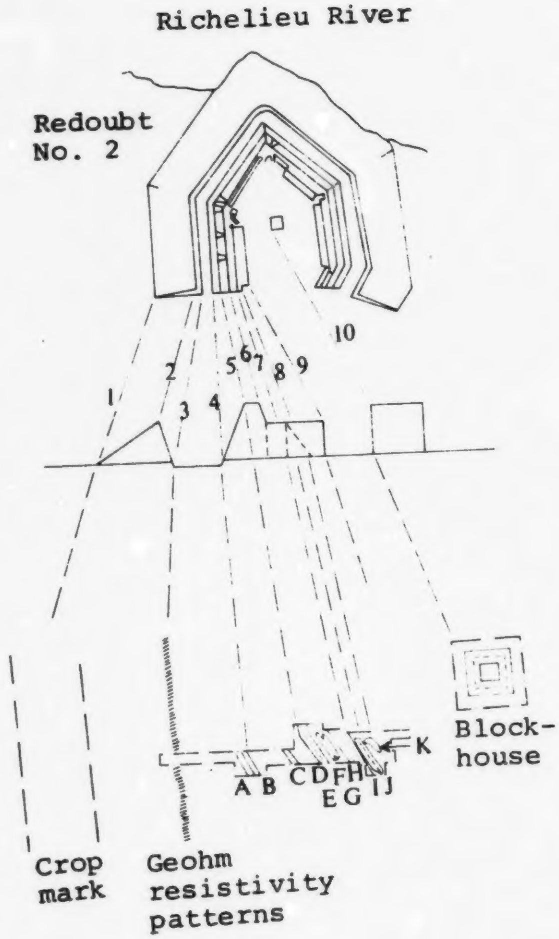
71 Annular and mocha ware: a, annular; b, c, banded yellow; d, e, annular; f, mocha.

72 The front redoubt (see Fig. 2). View towards the southwest in redoubt No. 2 excavation showing rotted wood above masonry wall. Masonry is barely visible at point of north arrow.

73 The front redoubt foundation (see Fig. 2). View towards the southeast showing redoubt No. 2 foundation wall after rotted wood layer was removed.



74 Plan of redoubt No. 2. Enlarged section of the 1814 plan of Ile-aux-Noix showing buildings within a redoubt. (Public Archives Canada.)



75 Redoubt correlation plan. The correlation includes a plan view of redoubt No. 2 from the 1814 plan and an interpretation of its profile (1-10) correlated with a plan of the archaeologically exposed foundation remnants (A-K). 1, perimeter of glacis; 2, crest of glacis; 3, counterscarp; 4, foot of the scarp; 5 to 6, parapet; 6 to 7, terreplein above casemate; 8, casemate wall, ramp line or barracks wall; 9, barracks wall; 10, blockhouse. In the archaeological section the crop mark (see Fig. 3, E) was not excavated while the geohm evidence of a possible structural pattern (see Fig. 3, H) did not correlate with positive structural remains. The remaining archaeological structures (see Fig. 4, A-K) thought to correlate with 4-8 are A, wood deposit; B, rock and mortar; C, soil stain; D, stone wall; E, cobble drain; F, stone wall; G, rotted wood; H, foundation rubble; I, rock and mortar; J. stone/brick drain; K, soil stain.

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(1980, $8.00; $9.60 outside Canada)